

1993

## Multi-functional work journeys

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# **MULTI-FUNCTIONAL WORK JOURNEYS**

**By**

**Suzanne M. Woolhouse**

**A Thesis Submitted in Partial Fulfilment of the  
Requirements for the Award of**

**Bachelor of Arts - Social Science (Honours)**

**at the Faculty of Arts, Edith Cowan University**

**Date of Submission: 14th June 1993**

## Abstract

For the vast majority of workers in the Kwinana Industrial Strip the private motor vehicle is largely preferred as the means of accomplishing the journey to and from work. This high level of private vehicle usage provides a greater opportunity for the journey to work to become multi-functional. This study reveals both the type and distribution of stops made by workers differs with age, gender, employment category, and residential postcode. From these findings it is suggested that, if any attempt is made to move people out of cars and onto any future public transport, the differing needs of the workforce must be addressed. That is, public transport transfer nodes must become focal points in that they provide services appropriate to worker needs.

## Declaration

"I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any institution of higher education; and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text."

(Suzanne M. Woolhouse)

14th June 1993

## Acknowledgments

I would like to acknowledge the support received from the following;

The Kwinana Industries Council,

The Kwinana Chamber of Commerce,

The Department of Planning and Urban Development  
(Cartography Section),

The Department of Resources Development,

The numerous companies who participated in this study,

Mr Lindsay Hunter for his supervision of this research,

Mr Vivian Forbes for his cartographic advice,

and, my long suffering friend Christopher for putting up  
with the trials and tribulations of this honours year.

# Contents

Abstract	ii.
Declaration	iii.
Acknowledgments	iv.
List of Tables	viii.
List of Figures	xi.
Glossary	xli.
<b>1 Introduction</b>	<b>1</b>
<b>2 Literature Review</b>	<b>8</b>
2.1 Journey to Work Research	9
2.2 The Multi Functional Work Journey	12
2.3 Data Sought From the Work Journey Studies	15
<b>3 Methodology</b>	<b>18</b>
3.1 Questionnaire Design	19
3.2 Survey Implementation	22
3.3 Data Management	25
3.4 Data Analysis Techniques	28
3.5 Limitations	29
<b>4 Workforce Profile</b>	<b>31</b>
4.1 Basic Characteristics	31
4.2 Detailed Characteristics	39
4.3 Work Journey	55
4.5 The Workforce Profile	57



<b>5</b>	<b>Multi-Functional Work Journeys</b>	<b>5 8</b>
5.1	The Multi-Functional Journey To Work	60
5.2	The Multi-Functional Journey From Work	61
5.3	The Stops Made On Multi-Functional Work Journeys	63
5.4	The Profile Of The Multi-Functional Work Journey	85
<b>6</b>	<b>Discussion</b>	<b>8 8</b>
6.1	Discussion of Findings	88
6.2	Application of Findings	91
<b>7</b>	<b>Conclusion</b>	<b>9 4</b>
	<b>References</b>	<b>9 6</b>
	<b>Appendices</b>	
A	Pilot Study Questionnaire	101
B	Final Survey Questionnaire	102
C	Introduction Letter to the Employee	103
D	Listing of the Companies Approached	104
E	Letter of Introduction to Companies	107
F	Letter to the Waterside Workers Federation	108
G	Cross Tab of Postcode and Age	109
H	Cross Tab of Postcode and Gender	111
I	Cross Tab of Postcode and Gender	114
J	Cross Tab of Age, Gender, Employment Category and Stop Category on the Journey to Work	116

<b>K</b>	Cross Tab of Age, Gender, Employment Category and Stop Category on the Journey from Work	117
<b>L</b>	Cross Tab of Postcode and Stop Category on the Journey to Work	119
<b>M</b>	Cross Tab of Postcode and Stop Category on the Journey from Work	121
<b>N</b>	Survey Database	123

## List of Tables

- |                 |  |
|-----------------|--|
| <b>Table 1</b>  | <b>Age Distribution of the Surveyed KIS Employees</b>                        |
| <b>Table 2</b>  | <b>Age Distribution of the Perth Statistical Division (Employed Persons)</b> |
| <b>Table 3</b>  | <b>Gender Distribution of the KIS and PSD Workforces</b>                     |
| <b>Table 4</b>  | <b>Employment categories of the KIS and PSD Workforces</b>                   |
| <b>Table 5</b>  | <b>Nine Most Populace Residential Postcodes for KIS Workforce</b>            |
| <b>Table 6</b>  | <b>GPMR Residential Areas for the KIS Workforce By Postcode</b>              |
| <b>Table 7</b>  | <b>Mode of Travel For The KIS Workforce</b>                                  |
| <b>Table 8</b>  | <b>Age and Gender Distribution of the KIS Workforce</b>                      |
| <b>Table 9</b>  | <b>The Modal Class, Median and Mean Age for KIS Workforce</b>                |
| <b>Table 10</b> | <b>Age and Employment Distribution of KIS Workforce</b>                      |
| <b>Table 11</b> | <b>Gender and Employment Distribution of KIS Workforce</b>                   |
| <b>Table 12</b> | <b>Age, Gender and Employment Profile of the KIS Workforce</b>               |
| <b>Table 13</b> | <b>Breakdown of Stops Made on the Work Journey</b>                           |
| <b>Table 14</b> | <b>Percentage of Total Stops Made in Each Category on the Work Journey</b>   |

- Table 15** Number of Stops Made on the Work Journey
- Table 16** Stops Made by Employees Making Multi-Purpose Journeys
- Table 17** Gender distribution of stops made on the journey to work
- Table 18** Age distribution of stops made on the journey to work
- Table 19** Employment distribution of the stops made on the journey to work
- Table 20** Gender distribution of stops made on the journey from work
- Table 21** Age distribution of the stops made on the journey from work
- Table 22** Employment distribution of stops made on the journey from work
- Table 23** Category 1 Stops Made on the Work Journey;  
(A)-Gender (B)-Age (C)-Employment
- Table 24** Category 2 Stops Made on the Work Journey;  
(A)-Gender (B)-Age (C)-Employment
- Table 25** Category 3 Stops Made on the Work Journey;  
(A)-Gender (B)-Age (C)-Employment
- Table 26** Category 4 Stops Made on the Work Journey;  
(A)-Gender (B)-Age (C)-Employment
- Table 27** Category 5 Stops Made on the Work Journey;  
(A)-Gender (B)-Age (C)-Employment

**Table 28** Category 6 Stops Made on the Work Journey;  
(A)-Gender (B)-Age (C)-Employment

**Table 29** Category 7 Stops Made on the Work Journey;  
(A)-Gender (B)-Age (C)-Employment

**Table 30** Category 8 Stops Made on the Work Journey;  
(A)-Gender (B)-Age (C)-Employment

**Table 31** Category 9 Stops Made on the Work Journey;  
(A)-Gender (B)-Age (C)-Employment

**Table 32** Category 10 Stops Made on the Work Journey;  
(A)-Gender (B)-Age (C)-Employment

**Table 33** Category 11 Stops Made on the Work Journey;  
(A)-Gender (B)-Age (C)-Employment

**Table 34** Category 12 Stops Made on the Work Journey;  
(A)-Gender (B)-Age (C)-Employment

## List of Figures

- Figure 1.1**      The location of the Kwinana Industrial Strip.
- Figure 1.2**      Urban development in the Greater Perth Metropolitan Region.
- Figure 2.1**      Single and Secondary Foci Journeys and Multiple Purpose Journeys.
- Figure 4.1**      The residential location of the KIS workforce.
- Figure 4.2**      The residential location of KIS Employees under the Age of 20 Years.
- Figure 4.3**      The residential location of KIS Employees Aged 20 to 30 Years
- Figure 4.4**      The residential location of KIS Employees Aged 30 to 40 Years
- Figure 4.5**      The residential location of KIS Employees Over the Age of 40 Years
- Figure 4.6**      The residential location of Female KIS Employees
- Figure 4.7**      The residential location of Male KIS Employees
- Figure 4.8**      The residential location of White Collar KIS Employees
- Figure 4.9**      The residential location of Blue Collar KIS Employees

## Glossary

<b>ABS</b>	Australian Bureau of Statistics
<b>BHP</b>	Broken Hill Proprietary
<b>BP</b>	British Petroleum
<b>CATS</b>	Chicago Area Transportation Study
<b>CBD</b>	Central Business District
<b>DOLA</b>	Department of Lands Administration
<b>DPUD</b>	Department of Planning and Urban Development
<b>DRD</b>	Department of Resources Development
<b>GPMR</b>	Greater Perth Metropolitan Region
<b>KCC</b>	Kwinana Chamber of Commerce
<b>KIC</b>	Kwinana Industries Council
<b>KIS</b>	Kwinana Industrial Strip
<b>LGA</b>	Local Government Authority
<b>MATS</b>	Metropolitan Adelaide Transportation Study
<b>MMTS</b>	Metropolitan Melbourne Transportation Study
<b>MRPA</b>	Metropolitan Region Planning Authority
<b>SATS</b>	Sydney Area Transportation Study
<b>SECWA</b>	State Energy Commission of Western Australia
<b>WMC</b>	Western Mining Corporation

## Chapter 1

### Introduction

Since the 1950's and the advent of widespread suburbanisation based on the private use of automobiles, work journey studies have become increasingly important. As Moriarty & Beed have stated that, "growing car use and the spatial dispersion of the city appear to have fed off each other" (1985, p. 4). One of the consequences of this is that journeys to and from work have assumed substantial dimensions for many employees in Australia's major cities. For example, in the early 1970's the journey to work accounted for over one third of all journeys made by Australian metropolitan residents (Neutze, 1981, p. 122 and Logan, 1974, p. 142).

Previous research on this topic has tended to concentrate on the means, distance and time involved in commuting. However, this study pursues the idea that many of these journeys have become multi-functional. That is, because the journeys have assumed such substantial dimensions in complex, crowded lives, in highly



dispersed cities, the opportunities are taken (if not compelled), to conduct other matters during the course of the journey.

Very little research appears to have been conducted into this facet of work journeys and yet it has substantial transport and retail implications. If planning authorities wish to encourage more people to use public transport, then some knowledge of these other needs of commuters is necessary for the establishment of subsidiary functions at transfer nodes. This is generally acknowledged as being important and implemented at some central and regional public transport transfer points, yet poorly researched.

While there are many facets to this problem, this research investigates the journey to and from work of the employees in a specific employment zone to ascertain who makes what type of stops. The Kwinana Industrial Strip (KIS) has been selected for the study (Figure 1.1) as it is an area which has features which make it ideal for this study. In particular, it is the major heavy industry site of the Greater Perth Metropolitan Region (GPMR), and therefore has substantial proportions of both blue and white collar employees. Furthermore, because this area is well removed from the rest of urban development in the GPMR (Figure 1.2) and has several neighbouring residential nodes, it facilitates the examination of both short and long distance travellers. Thus, a survey of the workforce in the KIS can provide some insights into employee characteristics, their commuter behaviour and destinations.

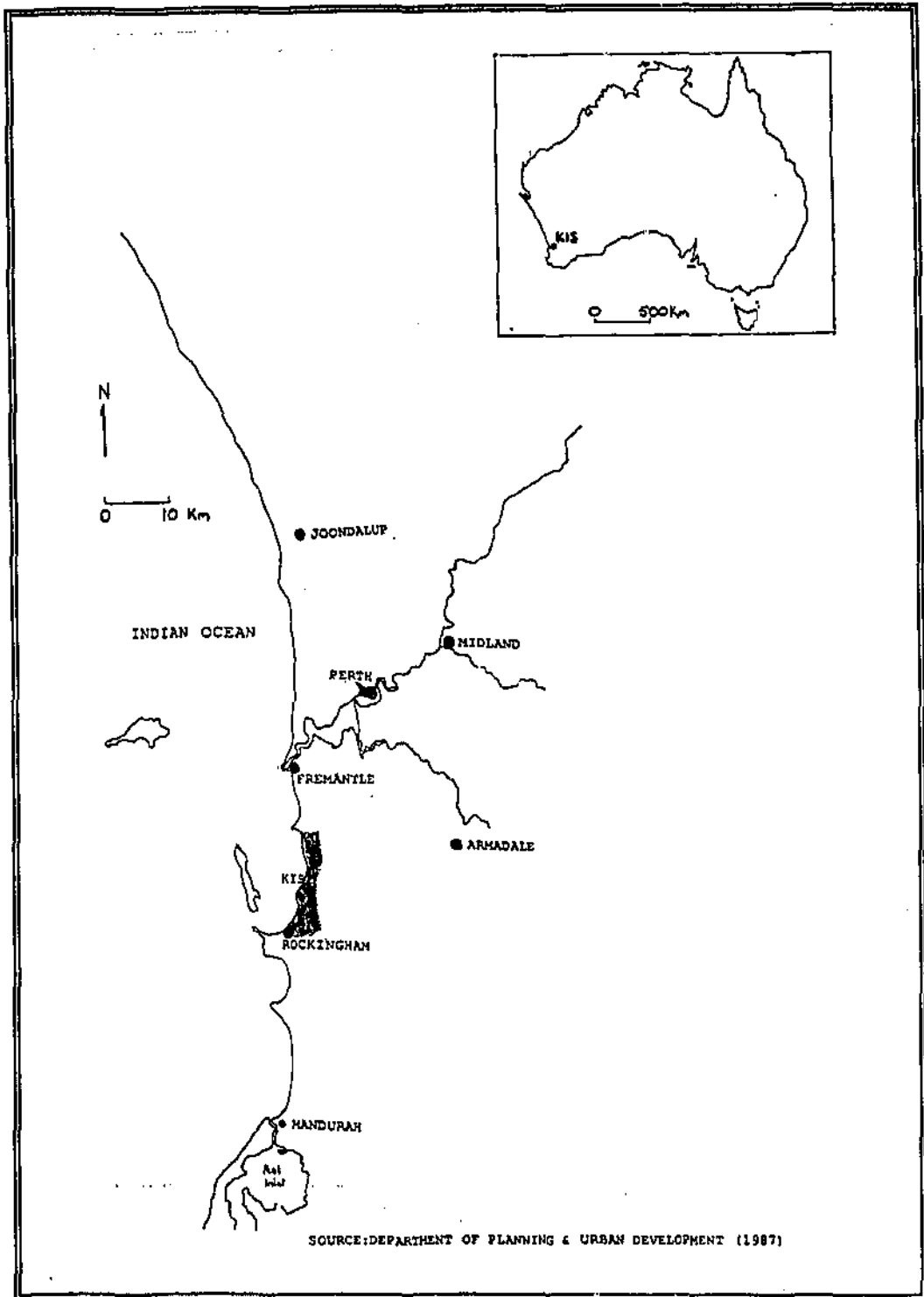


Figure 1.1: The location of the Kwinana Industrial Strip.

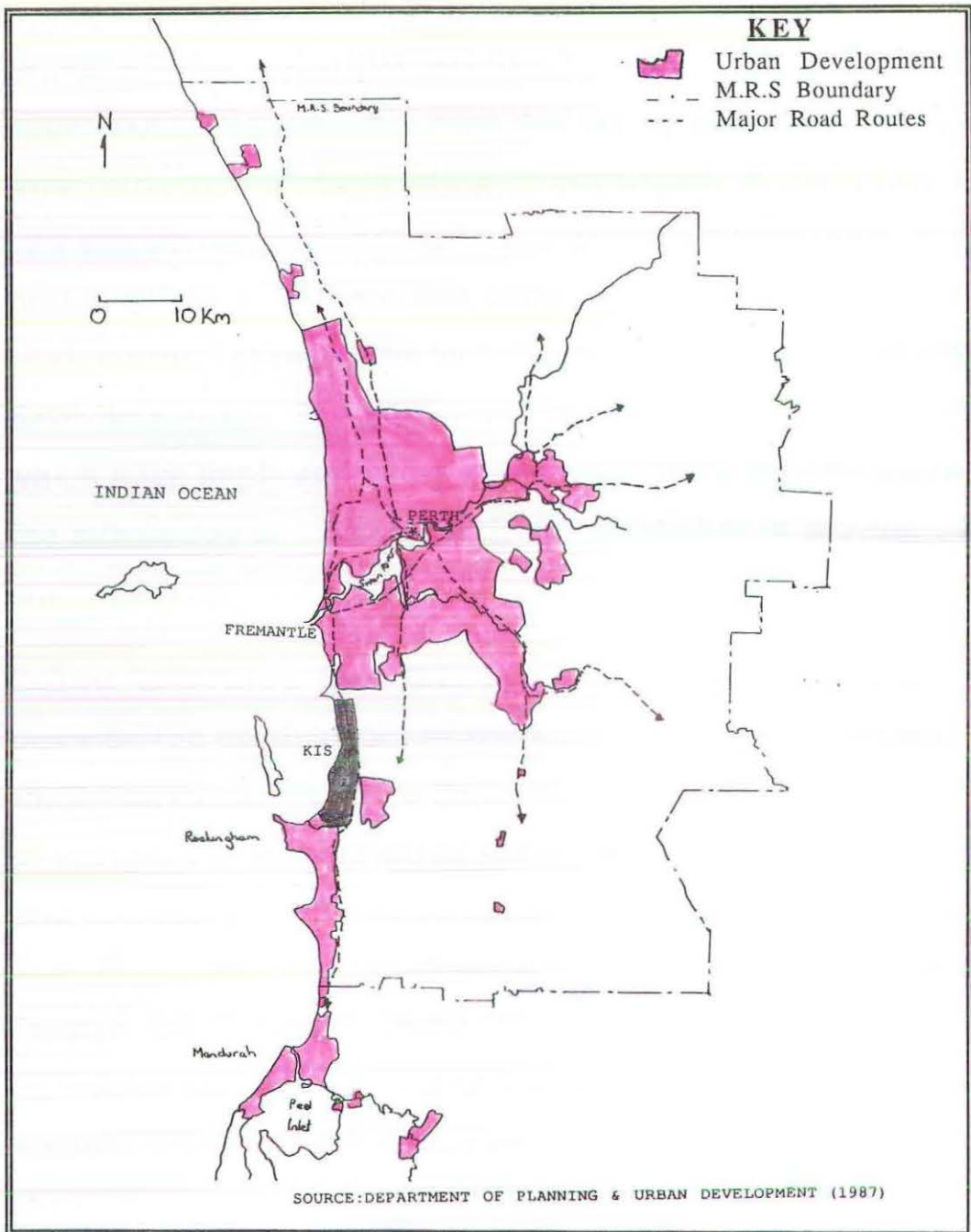


Figure 1.2: Urban development in the Greater Perth Metropolitan Region.

A questionnaire distributed to a sample of the KIS workforce provided the principal means by which this study was undertaken. The outcomes from this survey were most satisfying, with thirty two firms agreeing to participate in the study and 784 employees responding to the questionnaire. From this, a profile of the workforce was compiled which related to their work journey patterns, including intermediate stops that might have been made. From this information suggestions are made which have implications for better understanding and planning the movement of workers, with the possibility of moving them out of their cars and into public transport.

Before launching into this investigation, it is necessary to describe the peculiarities of the KIS to establish the context for the research design. Since the early 1950's the KIS has emerged as the major heavy industrial site of the GPMR. Originally the KIS and adjacent greenfield town of Kwinana were developed by the State Government to accommodate an oil refinery for the Anglo-Persian Oil Company (now BP Australia). Other propulsive industries such as, BHP's Iron foundry and rolling mill, Alcoa's alumina refinery, and WMC's nickel plant followed. All of these firms are involved in primary processing resources which are generally found within Western Australia; and these in turn have attracted a range of secondary and tertiary support industries. Further to this, there is also a range of service industries which have developed to cater for the KIS workforce. While the KIS grew strongly during the 1960's and early 1970's when most of the propulsive industries were established, it subsequently

suffered a phase of stagnation and industry closures. Only recently has the KIS started to attract major new industries such as Tiwest's titanium dioxide pigment plant.

As a starting point for this study, an attempt was made to ascertain the number of employees in the KIS. The difficulty is that no official data has been compiled other than the numbers in 15 major companies. However, in 1981 it was estimated by the Metropolitan Region Planning Authority (1985) that 7147 people were employed in the KIS. Current estimates by the Department of Resources Development (DRD) put the total KIS employment at under 6000, of which 4300 are employed in either the propulsive or secondary industries (Dames & Moore, in press). Consequently, the 784 employees who responded to this study questionnaire represent a sample size of over 10% of the total estimated KIS workforce.

The Town of Kwinana was developed specifically as a residential area to house the workforce of the KIS but this has since changed. During the 1950's while almost the entire workforce resided in this location, this study shows that only 8.8% of KIS employees, live in the Town of Kwinana (based on the survey sample). Workers now prefer to reside in the City of Rockingham which is readily accessible to KIS but is perceived to have a better environment. Also, until recently, the only land in the southwest corridor available for building was either north of KIS, or south of the centre of Rockingham, with little land released in the Town of Kwinana for new residential developments. Thus, the areas to the north and south of KIS began to provide larger

employee numbers while the number from the Town of Kwinana slowly fell.

Consequently, the KIS is a discrete industrial region which is most suitable for this study. Furthermore, this subject matter is of considerable interest to the Kwinana Chamber of Commerce (KCC), the Kwinana Industries Council (KIC), and the Department of Resources Development (DRD), who have given considerable encouragement and direct assistance.

This thesis consists of five major sections. the first is the identification of any previous research in this field and its relevance to the current topic. Next is the development of the research design and how this was implemented. The third and fourth sections relate to the analysis of the data and its compilation into profiles of the workforce and the multi-purpose journey. The discussion and applications of the study's findings conclude this thesis, with specific reference to the implications that exist for retail and public transport opportunities.

## Chapter 2

### Literature Review

Many studies have been undertaken on the characteristics of a population's journey to work. The majority of these studies occurred in the 1960's and 1970's, and concentrated on the transport patterns exhibited by the entire metropolitan region. At the time, Australian cities were undergoing rapid urban expansion and the journey to work studies were important tools in determining the many facets of the urban network. Since then, the study of urban transport linkages have been limited to the amount of pressure that these apply to daily activity patterns. It is generally accepted that the use of the private car for the journey to work is both quicker and more convenient than the use of public transport. However, even where public transport is available, most Australian workers still prefer to use private forms of travel (Huxtable, 1979). Yet, with the current trend towards urban consolidation and the increased pressure to alleviate traffic congestion, research is necessary to provide a basis for informed decision making.

Forster (1988) has indicated that Australian studies should be examined with reference to the philosophy current in the field of urban geography at the time they were completed. In the 1960's urban geographers were concerned with quantitative analysis and the spatial organisation of the urban environment, including some pioneer work by M.I. Logan on the journey to work. By the 1970's, and the rise of the Whitlam government, urban geographers became more concerned with the welfare aspects, "concentrating on the analysis of variations in levels of well-being and access to services and facilities and the equity issues that arose from such variations" (Forster, 1988, p. 72). By the 1980's, urban geography had shifted away from the social consequences of the urban form, towards the role economic forces played in the exhibited social patterns. In the 1990's the emphasis is on the political and economic basis of the urban form along with a resurgence in the historical approach to urban development. This study focuses on the social and economic factors which have led to the work journey changing from a single purpose trip to one which is multi-functional, and how this relates to unrecognised retail and public transport opportunities.

## 2.1 Journey To Work Research

In 1956 a landmark transportation study was completed into the travel patterns of both the people and vehicles in the Chicago region. This was the Chicago Area Transportation Study (CATS) and it used two surveys (a home interview and a commercial vehicle) to investigate the travel undertaken in Chicago region on



an average weekday in 1956. This study gathered data on the gender of the person making the trip, the addresses of both the origin and destination of each trip, mode of travel, and finally, the time taken to complete each trip. The CATS study found that approximately 40% of all travel by people in the Chicago region was work related, and other types of travel, which provided approximately 10% each of the total travel undertaken, were for personal business and social or recreational reasons. Of the trips identified by CATS, approximately three quarters were made by private vehicles, and one quarter by all forms of mass transit (Berry & Horton, 1970, pp. 513-515).

Australia's most significant journey to work studies were completed during the 1960's and early 1970's in Sydney and Melbourne, partially following the CATS model. The Sydney Area Transportation Study (SATS) was undertaken in 1971 and has been used in conjunction with the Australian Bureau of Statistics (ABS) 1971 Census of Population and Housing by many researchers, the most notable of which is Manning (1978). Like the study undertaken in Chicago, the SATS used a home interview survey to obtain data on the journey to work of 20,347 people, which amounted to approximately 2.5% of the total Sydney population. One finding of this study was that approximately 33% of home based journeys were for work related purposes. In 1964 a similar study, the Melbourne Metropolitan Transportation Study (MMTS), showed that approximately 40% of all home based person trips were work related (Logan, 1974, p. 143). Other major urban areas have also

been the subject of transportation studies (Adelaide 1965, and Brisbane 1960). All of these studies used the data gained to plan for the future extended use of the private car and not for better integration of public transport.

Research was conducted in Britain in the late 1970's into a series of discrete employment zones which studied the trips made to and from work by office staff. The study used as its sample workforce fifteen buildings, housing ninety one firms, in four urban areas, the City of London, Camden, Westminster, and Southwark (Daniels, 1980, p. 2). The aim was to compare the journey to work characteristics of office workers from several different decentralised employment locations and its findings indicate that work journey characteristics are greatly influenced by the location of offices within the urban area (Daniels, 1980, pp. 158-162). Hence, it can be concluded that the location of an employment site affects the travel patterns of the workforce. Translating these findings to this research, because the KIS is a unique employment zone, the results obtained may not be applicable to other areas in the GPMR, or even other heavy industry employment zones in urban locations. However, the results can be used as a case study comparison for other investigations.

## 2.2 The Multi-Functional Work Journey

Tranter (1984, p. 1) has stated that "all individuals within a city have only a finite amount of time in which to organise their activities within a day." Furthermore, the people also respond to

constraints imposed by the urban environment on their activities, limitations which cover three categories; capability, coupling and authority. Capability constraints are limitations imposed by the biological functions of the individual or by the availability of the tools needed to perform any activity. Coupling constraints affect the activities of one individual due to the need to synchronise these activities with those of other individuals. Authority constraints regulate when individuals can perform activities (or access locations) due to the action of laws. These factors identified by Tranter (1984, pp. 1-13) provide a basis for an examination of the multi-functional work journey.

Faulkner (1981, p. 20) noted, during a study of new residents in Campbelltown, NSW, that adjustments were made in the travel behaviour of household members after moving into the district. In particular, the mobile breadwinner assumed responsibility for activities, such as incidental shopping, normally performed by the housebound spouse. These adjustments, include the tendency to engage in multi-purpose journeys involving the use of foci other than the home (secondary foci) as staging points for trips (Figure 2.1). This difference is important as normally the home is regarded as the primary focus, because it is from there that a vast majority of journeys originate.

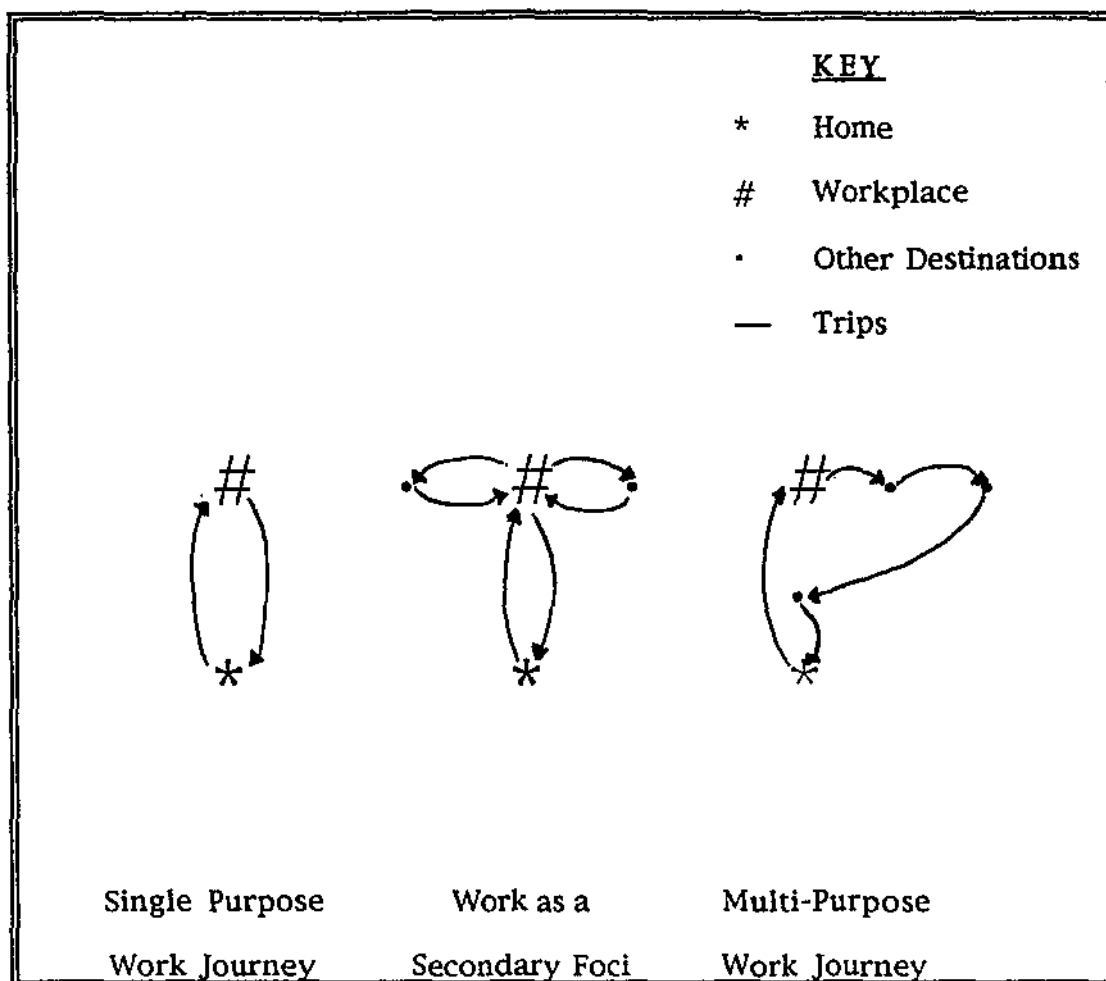


Figure 2.1: Single and Secondary Foci Journeys and Multiple Purpose Journeys (adapted from Faulkner, 1981, Figure 2).

Due to marked increases in both cross-suburban commuting, and in long distance commuting to outer suburban areas (Alexander, 1979, p. 166), the concept of secondary foci is significant “simply because they contribute to movement economies by enabling several trips to be integrated into multi-purpose journeys...When trips are linked in this way the effort in travelling between nodes is much less than it would be if contact with each destination occurred as a result of single-purpose journeys originating from the home” (Faulkner 1981, p. 21). Tranter (1984) identified that the organisation of a household’s activity pattern can be reliant

on external constraints, making it necessary for commuting families to integrate several trips with the work journey, since this is the only way that shops, banks, and other facilities can be accessed during their operating hours. Thus, as Hutchinson has observed in his study of Sydney, between 1961 and 1981;

“...the important dispersion of jobs from the central employment areas and the continued increase in commuting to these jobs by car resulted in further reductions in the use of public transport. This changing structure of work trip travel in the Sydney region would suggest that some reorientation of public policy is required to recognise the realities of the strong car-based travel demands that exist in the outer suburbs.”  
(p. 35).

Work journeys and the location of workplaces, are two of the most important aspects of modern cities, in terms of both structure and dynamics (Alexander, 1979, p. 155). Anderson (1980) indicated that the journey to work fell into the compulsory trip category. However, any stops made on such journeys are voluntary and therefore the journey to work, if considered a multi-purpose one, could be regarded as having two components, one compulsory and the other voluntary. While the primary aim of the trip is compulsory, the other activities performed are completed voluntarily and are only governed by the constraints stated by Tranter (1984) and Burnley (1980, p. 238-240). Thus a compulsory single purpose journey, is

consolidated with a voluntary single purpose trip, which results in a multi-functional work journey.

### 2.3 Data Sought From Work Journey Studies

A unique source of work journey data exists in Australia because since 1976, the ABS Census of Population and Housing has included questions relating to this topic. These questions relate to the location of the respondent's workplace, the type of industry undertaken at that location, occupation and mode of travel. These questions were asked in addition to the general population information and has resulted in a large information pool for the entire Australian population. The presence of this comprehensive database has meant that ABS Census data has been used for most recent journey to work studies. However, this source has limited use for this research because no information has been gathered on intermediate stops. This lack of available data has meant that primary data collection is necessary.

Out of the previous research, several significant aspects of data gathering for work journeys have been identified. From these, the most important information required is the location of each employee's home and workplace. As the employment zone for this study has been identified as the KIS, the main emphasis is on residential location information. This can be mapped to show the spatial distribution of the employees and subsequently used as a basis for the analysis.

According to O'Connor & Howe (1977, p. 21) the comparison between the travel patterns of men and women is one of the

major short-comings of many large scale urban transportation studies. The failure to make this distinction has led to generalisations which are only applicable to men and consequently misleading conclusions have been generated. Manning (1978) and Neutze (1971 & 1972) have also noted that work journeys differ with gender, an aspect which is taken up in this research.

Journey to work research should also identify the mode of travel for the surveyed employees. King (1980, p. 10) found that the "mode of travel for the journey to work is strongly differentiated from area to area...", and hence this study has provided for this analysis. Short (1984, pp. 169-171) indicates that the mode of travel will depend upon the length and purpose of the journey, and the available types of transport. Furthermore, Short also concluded that the use of the private car is also significant. This is evident in Australia where in most cities, the spread of suburbanisation occurred during the era in which the automobile developed as the major form of transport. Hence, not only should the mode of travel be catalogued, but also analysed in relation to the residential location of employees.

Alterations can occur in journey to work characteristics, depending on the age of the worker. Manning (1978) and Neutze (1971 & 1972) both indicate that this is the case because employees have different responsibilities and needs at various phases of their working lives. Abu Lughod and Foley (1960, pp. 95-133) have shown that adult workers pass through several life cycle stages, which for the purpose of this study can be

amalgamated into four distinct groups. Pre-household formation, household formation, family formation and post family formation. As these change, so do the pressures placed on daily activity patterns, and subsequently the work journey characteristics.

Another factor which may affect the characteristics of the work journey is the workers' occupation. These differences between white and blue collar employees may exist because of flexibility factors regarding work hours. Furthermore, different employee groups may be disadvantaged by the costs associated with different forms of transportation. This may also be affected by dispersed employment locations, as associated with blue collar employment (Tranter, 1984, p.8). The KIS is an employment zone which is well removed from the GPMR and as such blue collar employees may have differing work journey characteristics to white collar employees.

This study is concerned with the multi-functional work journey, however, no previous studies have been found on this subject. Hence the types of intermediate stops made on work journeys are assumed to be those that would otherwise be made as single purpose home based journeys and include social activities, shopping, personal business, family, and other activities. However, while the complexity of modern urban living is acknowledged, its outcome in changing behaviour patterns, such as the multi-purpose work journeys has largely been ignored. As such, the purpose of this research is to ascertain the extent, type and significance of these journeys.



## Chapter 3

### Methodology

Having established from the literature the direction which the research should take, the next step involved the matter of procedure. As no previous studies on exactly this topic have been identified, there is little in the way of direction regarding the approach this study should take. However, it is noted that most journey to work studies relied on ABS census data or on material gathered in transportation studies which do not provide information regarding the multi-functional work journey. Thus it is necessary to establish a body of original data which in turn raised the question of how this might be achieved.

The questionnaire was chosen as the means of data collection because it allowed a large number of workers to be surveyed quickly and easily and hence allowed a more detailed picture of the KIS workforce and their daily journeys. Another procedural factor which influenced the decision was that, in many cases, the workers could only be approached during their lunch and tea

breaks, hence the implementation of a suitable number of interviews would not have been possible. Thus, the questionnaire provided a quick and comparably straight forward means of collecting essential information from employees with minimum intrusion into their stand-down time.

### **3.1 Survey Design**

The objective of the questionnaire was to gather information relating to the following topics;

1. residential suburb,
2. occupation,
3. age,
4. gender,
5. mode of travel, and
6. the number and type of stops made on the work journey.

This information was required to meet the research objectives and falls into two categories. The first establishes a workforce profile for the KIS employees; the second provides the specific information regarding the multi-functional journey to work. It was decided to ask the employees about their work journeys over a two day period, as surveying one day might provide biased information. On the other hand, surveying a five day week risked employees being unable to remember what they did several days ago or not bothering to complete the questionnaire. Hence, while a longer time frame may have been more desirable,

this survey is only concerned with the work journey over a two day period, 'yesterday' and 'today'.

In designing the questionnaire several factors were taken into consideration,

1. the type of information required,
2. the questionnaire length,
3. question design, and
4. the ease of analysis.

Recognising that a large proportion of the KIS workforce have a non English speaking background, an approach which is easy to understand was needed, as a complicated questionnaire could have led to high levels of refusal or incomplete forms. This, coupled with the general apathy most people exhibit when asked to complete surveys, meant that a lengthy questionnaire could suffer from a high refusal rate. For these reasons, it was decided that the ideal questionnaire for this study would consist of a single side of an A4 page. This length meant that the questionnaire could be completed quickly and thus minimise the intrusion into the workers' free time.

It was also decided that the questions would be posed in such a way that affirmative responses merely required a box to be ticked. The appearance of the questionnaire also needed to be uncluttered and easily readable. Once these parameters were established, the next step was to design questions which would deliver the desired information. A preliminary questionnaire was designed which had two sections, the first related to the

workforce profile while the second consisted of a matrix to gather attributes of the journey to work (Appendix A).

This prototype questionnaire was used in a pilot study of thirty three employees at the Mount Lawley campus of Edith Cowan University. This involved a cross section of staff from different employment groups including lecturers, gardeners and maintenance personnel. This trial, although not conducted in the KIS, provided valuable feedback on the questionnaire's suitability. Generally it was found to be too difficult to understand and many respondents were confused as to how the questions were to be answered. These problems indicated that the questionnaire required some refinement to make it easier to complete, especially as, in many cases, the researcher would not be available to answer questions from the respondents.

The second section of the trial questionnaire caused the most difficulties, because many employees were unfamiliar with matrix layouts. This led to the questionnaire being modified to include three sections; the first remained unchanged, but the matrix was divided into two parts. One focused on the employees' travel pattern for 'yesterday', the other for 'today'. The final questionnaire also included additional visual information to assist its completion (Appendix B). These changes were not related to the information required, but to the presentation. That is, the questions were presented in a more easily understandable form and subsequently the majority of workers had little difficulty in completing the survey. On the final questionnaire the other side of the A4 page, became the front and had a short covering letter,

on Edith Cowan University letterhead, addressed to the employee and identifying the study as a component of a postgraduate qualification (Appendix C).

### 3.2 Survey Implementation

The first phase in the implementation of the survey, involved the identification of companies which should be approached to participate in this study. As it was not going to be possible to select employees at random, the companies needed to represent the four levels of industry to at least, in this dimension, provide a cross section of the KIS workforce.

The selection process was started by contacting industry groups for assistance in identifying companies within the study zone. The Chamber of Commerce and Industry of Western Australia has a sub-group which deals directly with the study area, the Kwinana Industries Council (KIC). However, the KIC deals primarily with the larger companies (level 1 and 2 industries) in the study area. For assistance in locating smaller companies (level 3 and 4 industries) the Kwinana Chamber of Commerce (KCC) was approached. Both the KIC and the KCC provided details of member companies, as well as a contact name in each company. The KIC identified twelve, and the KCC forty three companies (Appendix D).

When the letters of introduction (Appendix E) were sent to each of the identified company officers, these referrals proved valuable in getting a 'foot in the door'. The introductory letters requested co-operation in two ways. Firstly, to provide details of

the company's total workforce, and secondly, their willingness to allow the questionnaire to be distributed to their employees. The letters were followed with introductory telephone calls during which, the study was briefly explained, their co-operation requested, and their willingness to participate identified. In some cases it was necessary to arrange personal consultations to further explain the study to senior company officials before approval was gained.

In this way fifty five companies were approached, nine did not wish to participate in the study and a further five were unable to be contacted. Of the forty one companies who did participate, twelve limited their involvement to the provision of their company's workforce details. However, during the period of the study a further eleven companies were approached, and three allowed the distribution of the questionnaire. This meant that thirty two companies allowed access to their employees and fifty two provided their total workforce details (Appendix D).

Of the larger companies recommended by the KIC only, Alcoa Australia was unwilling to participate in the survey. This was primarily because several years previously, industrial unrest had occurred when workers wanted the company to provide bus transportation to Kwinana from various pick-up points to ease transport costs. An unpublished Alcoa investigation (edited by B. Carbon) was conducted, but unfortunately no hard copy of the report could be located by either Alcoa or Mr Carbon and hence I was unable to include this material in my research. However, Alcoa did provide details of their employees which helped build a

profile of the residential distribution of the total KIS workforce. Another four companies, Cockburn Cement, CSBP & Farmers, Western Mining Corporation, and United Construction, were only willing to provide access to selected sections of their workforce. In most cases these were the office and maintenance staff, thus leading to a disproportionately high percentage of white collar workers in the survey than might otherwise have been expected. One company, Co-operative Bulk Handling, required that the study proposal be not only approved by management but also by the union which represented workers at the site, The Waterside Workers Federation (Appendix F). Once the union had given approval for the survey, management were more than happy to co-operate. Furthermore, the union encouraged its members to complete the questionnaire, leading to a high percentage of returns from that company.

The distribution and collection of the questionnaire took place during the last two weeks of January 1993, and in most cases the companies assisted this procedure and mailed them to the University. However, in some cases the surveys were distributed directly to the workers and collected individually. Companies which allowed this method of distribution were, SECWA, Coogee Chemicals, AAA Bulk Haulage, Cockburn Hire Service, John Holland Construction, and Terrace Smash Repairs. Most companies also attached a covering letter to the questionnaire form, indicating that the survey was not company instigated and that they were assisting an external research project.

The workers who completed the survey did so voluntarily and were not chosen by any process over which the researcher had control. Some employees who were asked refused and thus only those interested, co-operated. However, in most cases, workers were more than willing to complete the short questionnaire. From discussions with some staff members, it appears that the journey to work is a matter of concern for many employees and consequently there was high level of participation.

### 3.3 Data Management

Once all the questionnaires had been returned the information gained was entered into a computer database, Microsoft Excel 4.0, using numerical values for each question's response (Appendix N).

The 'residential suburb' name was converted to a postcode by employing the "Western Australian Postcodes-Alphabetic & Numeric Listings Vol. 1 (1992/93)", the current listing at the time. This allowed the data relating to the employees' addresses to be grouped into spatial areas larger than individual suburbs, but still smaller than many of the Local Government Authorities in the GPMR. Any unknown or unstated suburbs were given a zero (0) coding.



'Occupation' was grouped on the basis of an interpretation of the description provided by the respondent, with regard to the ABS categories, and coded as either,

0. unknown,
1. white collar, or
2. blue collar.

The age groupings were given the following numerical values in the database,

0. not stated,
1. under 20 years,
2. 20 to 30 years,
3. 30 to 40 years, and
4. over 40 years.

Gender was also converted to a numerical value,

0. not stated,
1. males,
2. females.

The mode of travel was converted to a numerical value as follows,

1. private car (driver),
2. private car (passenger),
3. public transport,
4. company vehicle,
5. motorcycle,

6. bicycle, and
7. other or unknown.

The questions relating to the stops made whilst travelling between home and workplace were catalogued and totalled for each respondent over the two day survey period. Because the nature of the stop constitutes the major concern of this research, this characteristic was divided into twelve categories which had been identified during the pilot study and coded as follows;

1. Service station,
2. Deli and takeaway food,
3. Newsagent and video store,
4. Groceries,
5. Other retail,
6. Professional services (e.g. doctor, dentist, lawyer),
7. Personal business, finance and postal activities,
8. Work related activities,
9. Children, spouses and car pools,
10. Hotels, social clubs, TAB, and personal visits,
11. Sport and recreation, and
12. Other.

The database matrix records information on, the total number of stops made on the journey to work, the total number of stops made on the journey from work, the number of stops made in each stop category on the journey to work, and the number of stops made in each stop category on the journey from work. This information supplies an answer to the research question, "Is the

journey to work multi-functional?" which can be related to the data regarding the surveyed workforce's characteristics. This information can then be used to provide information for retail opportunities which need to be located close to any transfer nodes if people are to be persuaded to change from motor vehicles to public transport.

As the returned questionnaires were received, each was given an individual number (from 1 to 784) to identify it in the database. They were also designated a company identification code (from 1 to 32) and level of industry code (from 1 to 4). This allowed the information to be catalogued easily and available for further analysis as well as easy retrieval.

### 3.4 Data Analysis Techniques

Once the information was entered into the database, the workforce details were analysed to determine the percentages for each of the categories in the following characteristics;

1. gender,
2. age,
3. employment group,
4. residential postcode,
5. travel mode,
6. stops made on the journey to work, and
7. stops made on the journey from work.

Cross tabs between the various database items were undertaken to provide in-depth details of the surveyed workforce. This in

turn formed the basis for an analysis of the workforce profile. This provided a framework for a detailed analysis of the multi-functional work journey and in particular, 'which workers stopped where'. Those characteristics identified in the workforce profile, were used as a basis for comparison with those found in the analysis of 'who makes what type of stops' on the work journey. This assists the study to determine the characteristics of workers for which the work journey is multi-functional.

The cross tabs which were used to further refine the details about the composition of the surveyed KIS workforce were;

1. age and gender;
2. gender and employment group;
3. age and employment group;
4. age, gender and employment group;
5. residential postcode and age;
6. residential postcode and gender;
7. residential postcode and employment group;

### 3.5 Limitations

A factor which may have affected the results of the survey is that a true random selection of both the companies and workers was not possible. As the questionnaire was in most cases distributed by company officials, it is difficult to estimate the number of workers who were approached but objected to participating or failed to return their questionnaires by the nominated date. Unfortunately this aspect of the survey cannot

be significantly improved due to company constraints on unauthorised personnel entering work sites.

A further problem relates to the survey being conducted over a two day period. However, it should be noted that this research is only concerned with the question "Is the journey to work multi-functional?" It might have been desirable to include selected days or a total week but given the characteristics of the workforce and the method of implementation, it was decided to concentrate on one facet.

Finally, it is recognised that the KIS is a specialised employment area in terms of: its situation regarding the GPMR; the type of industries and the characteristics of the workforce. Consequently, the findings from this survey should be interpreted cautiously with regard to either other industrial regions or the workforce at large. Therefore, bearing in mind these limitations further study should be undertaken to either confirm or refute these findings and probe other aspects of the multiple purpose work journey.

## **Chapter 4**

### **Workforce Profile**

This section establishes the profile of the workforce sampled in the survey. Because it represents an estimated 10% of the total KIS, and possibly is skewed towards white collar employees, the findings must be interpreted carefully in terms of any general applications. The profile examines the characteristics of age, gender, employment category, mode of travel, and residential location. All percentage figures used in this section are based on the 784 employees used in the sample. The ABS 1991 census data for the Perth Statistical Division (PSD) is used to provide a comparison with the GPMR workforce (ABS, 1993).

#### **4.1 Basic Profile**

##### **Age**

By examining the age distribution of the survey group (Table 1), it is apparent that a large proportion of the workforce is over the age of 30 years. Of the survey group, only 2.4% were under the

age of 20 years, 23.8% were between the age of 20 and 30 years, while 68.7% were over the age of 30 years. When this is compared with information gained from the PSD, the sampled KIS workforce is slightly older (Table 2). The under 20 years age bracket shows that a smaller proportion of the KIS workforce falls into this category when compared to the PSD. It is difficult to make any comparisons in the other age groupings as differing cut-off ages are used. However, the figures suggest that the Perth Statistical Division and the KIS are similar overall.

Table 1

Age Distribution of the Surveyed KIS Employees

	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
% of KIS Employees	2.4%	23.9%	32.0%	36.7%	5.0%	100.0%

Table 2

Age Distribution of the Perth Statistical Division (Employed Persons)

	UNDER 20 YEARS	20-34 YEARS	35 YEARS AND OVER	TOTAL
% Employed in PSD	7.8%	37.9%	54.3%	100.0%

From the age information provided in the survey the measures of central tendency were derived using the methods described in O'Brien (1992, Chp 4). From this, the modal-class age was 'over 40 years', the median age 37 years and the mean age 39 years. Using the same techniques on the available PSD data, the modal-class age was '35-44 years', the median age 36 years, and the mean age 36 years. These figures imply that overall the KIS workforce is older than that in the PSD. This also suggests that

the workforce is more experienced and at the latter stages of the family life cycle. The small number of workers under the age of 20 years also indicates high levels of youth unemployment, a factor which is the case for the entire GPMR.

### Gender

As the KIS is essentially a large scale primary processing employment zone, it is not surprising that the workforce profile shows 82.5% of employees are male (Table 3). When compared to the data for the PSD however, the male domination of jobs in KIS is apparent. Unfortunately, the 'not stated' category for the surveyed KIS workers is quite large and may well affect these results.

Table 3

#### Gender Distribution of the KIS and PSD Workforces

	MALE	FEMALE	NOT STATED	TOTAL
% of KIS Employees	68.4%	14.5%	17.1%	100.0%
% Employed in PSD	56.0%	44.0%	-	100.0%

### Employment Category

The employee's response to the question on occupation allowed the information to be categorised into two broad groupings, white and blue collar employment categories. Of the responses, 51.4% were found to be white, 46.8% blue collar employees, and 1.8% failed to list their occupation (Table 4).



Table 4

Employment categories of the KIS and PSD Workforces

	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
% of KIS Employees	51.4%	46.8%	1.8%	100.0%
% Employed in PSD	62.5%	31.0%	6.5%	100.0%

When compared to the PSD data, the KIS survey group has a greater proportion of blue collar workers, however, for a heavy industry employment zone this difference was expected, in fact it was anticipated that it would have been higher. The low number of blue collar workers is probably a reflection that some employers only allowed access to graded or salaried staff. Another factor which may have affected the results is that a substantial number of blue collar workers in KIS are private contractors and not part of the employed workforce (eg. Hismelt Corporation).

**Residential Postcode**

When the KIS was established the government also built housing for the employees in the strip which is now the Town of Kwinana. However, since then transport routes have improved, and with the extension of the Kwinana Freeway, many employees commute from all parts of the GPMR. In this survey the majority of sampled workers came from residential postcodes located south of the Swan River and in particular those areas which surround the KIS (Figure 4.1). From this data it is apparent that workers are willing to travel further between home and workplace in order to reside in preferred locations. This contrasts

with the position in the early 1950's when the vast majority of workers in the Kwinana Industrial Area lived in the Town of Kwinana (Russell, 1979). This study found that the largest groups of workers came from postcodes 6168 and 6169 (Table 5) which are areas within the City of Rockingham to the South of Kwinana. The next largest concentration of workers came from postcode 6163, followed by 6167, which is centred on the Town of Kwinana.

Table 5

Nine Most Populace Residential Postcodes for KIS Workforce

Postcode	Suburbs	% of Total KIS Workforce
6168	Cooloongup, Garden Island, Hillman, Peron, Rockingham	14.7%
6169	Port Kennedy, Safety Bay, Shoalwater, Waikiki, Warnbro	13.7%
6163	Bibra Lake, Coolbellup, Hamilton Hill, Hilton, Kardinya, North Lake, O'Connor, Samson, Spearwood	9.1%
6167	Anketell, Calista, Casuarina, Kwinana, Mandogalup, Medina, Orelia, Parmelia, Peel Estate, Postans, The Spectacles, Wandi	8.8%
6210	Appendene, Barragup, Coonanup, Dawesville, Dudley Park, Erskine, Falcon, Furnissdale, Greenfields, Halls Head, Lakelands, Madora, Mandurah, Meadow Springs, Parklands, Park Ridge, San Remo, Silver Sands	4.6%
6149	Bullcreek, Leeming	2.6%
6166	Coogee, Henderson, Munster, Wattleup	2.3%
6164	Banjup, Jandakot, South Lake, Success, Yangebup	2.3%
6156	Attadale, Melville, Willagee	2.0%
	% OF TOTAL SURVEYED KIS WORKFORCE	60.0%

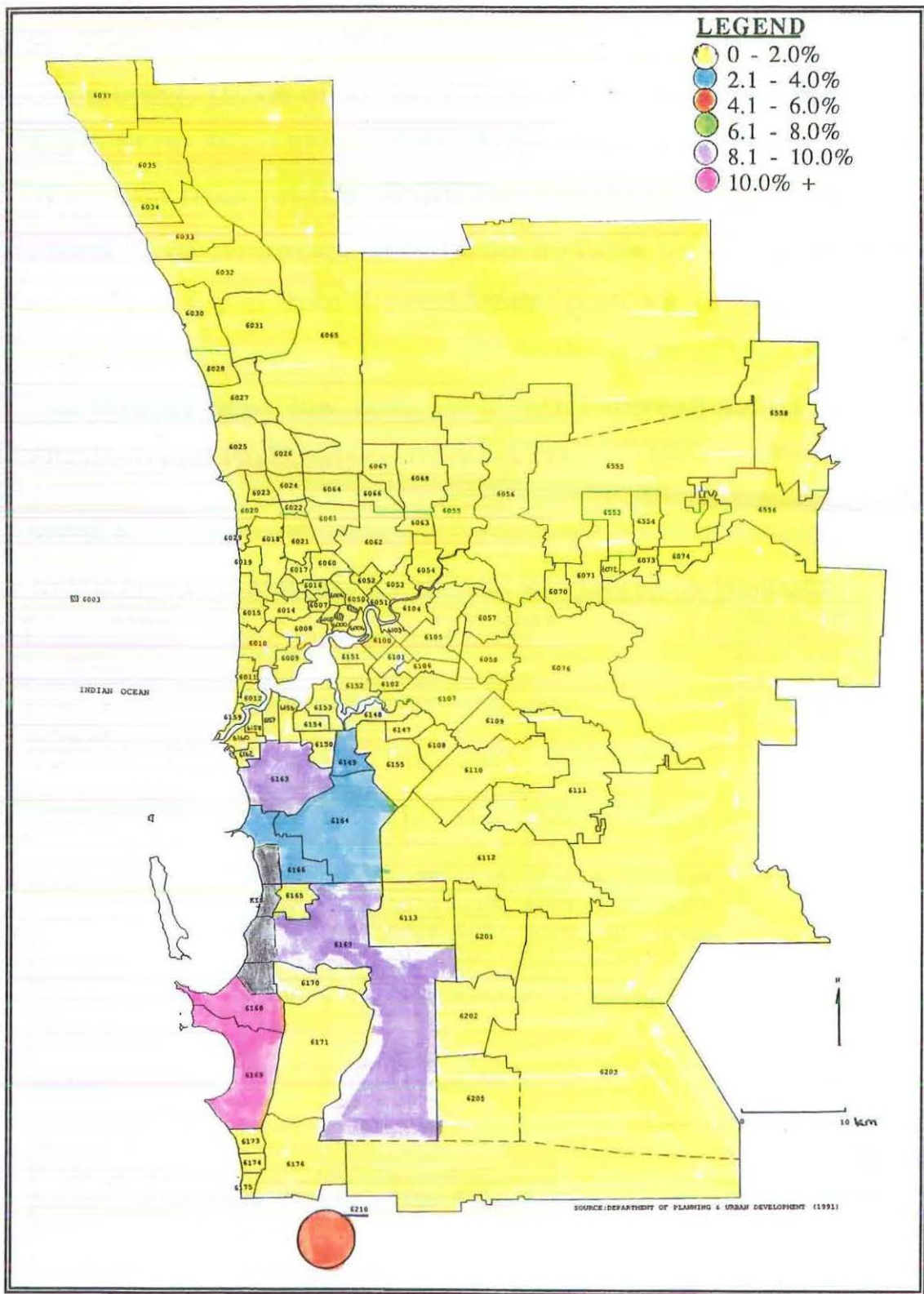


Figure 4.1: The residential location of the KIS workforce (Source: Appendix G).

Surprisingly, because of the considerable distances involved in commuting, 10.5% of workers come from residential postcodes North of the Swan River, while a large group of employees 11.1%, also come from prestige southern suburbs such as Applecross, Alfred Cove, Winthrop, and Murdoch (Table 6). A smaller group of workers travel from the residential postcode of 6210 which is centred on the town of Mandurah, to the south of the KIS, which has several new, low cost, residential developments such as Elizabeth and Parklands on its outskirts.

Table 6

## GPMR Residential Areas for the KIS Workforce By Postcode

Area	Postcodes	% of KIS
Other South East Suburbs	6201, 6204, 6205, 6208, 6213	0.8%
North East Suburbs	6056, 6071, 6081, 6082	0.9%
South East Suburbs	6075, 6100, 6102, 6105, 6107, 6108, 6109, 6110, 6111, 6112, 6113, 6147	8.2%
Northern Suburbs	6007, 6008, 6009, 6010, 6011, 6012, 6014, 6016, 6018, 6019, 6020, 6021, 6022, 6023, 6024, 6025, 6026, 6027, 6028, 6050, 6051, 6053, 6054, 6060, 6061, 6062, 6064, 6068	10.5%
Prestige Southern Suburbs	6148, 6149, 6150, 6151, 6152, 6153, 6154	11.1%
Southern Suburbs	6155, 6156, 6157, 6158, 6160, 6162, 6163	18.2%
Suburbs to the South of KIS	6169, 6171, 6174, 6175, 6210	19.5%
Suburbs Surrounding KIS	6164, 6165, 6166, 6167, 6168, 6170	29.2%
	NOT STATED	1.7%
	TOTAL SURVEYED KIS WORKFORCE	100.0%

### Mode of Travel

As KIS is an outer suburban employment zone, it was anticipated that the private car would play a major role in the employees work journey. However, the extent of its use surpassed expectations (Table 7). The questionnaire asked workers to indicate their mode of travel both for 'Yesterday' (Day One) and 'Today' (Day Two), with the expectation that a variety of travel modes would be identified. In reality it was heavy oriented towards the private car with almost 90% of employees using this method of transport. The only other significant mode of travel used by workers was the use of the company vehicle for work-related journeys which accounted for 5.6% of employees. Public transport was only used by 1 person (and then only on 'Day One', as this person drove a private car on 'Day Two'). Bicycles, motorbikes and other forms of transport accounted for approximately 4% of survey respondents. When compared to the PSD data from the 1991 census, which showed that 61.1% of employed people drove a vehicle to work, the KIS workforce can be seen to be more heavily reliant upon private transport for the completion of the work journey. With such a large number of employees driving both private and company vehicles into the KIS, this study indicates considerable scope for the development of public transport, provided it can cater for the range of destinations indicated in this research.

Table 7

## Mode of Travel For The KIS Workforce

		MODE OF TRAVEL DAY ONE							TOTAL
	MODE	1	2	3	4	5	6	7	
	1	78.3%	2.3%	0.1%		0.1%	0.4%	0.4%	81.6%
MODE	2	3.3%	5.2%					0.1%	8.7%
OF	3								0.0%
TRAVEL	4				5.6%				5.6%
DAY	5					2.0%		0.1%	2.2%
TWO	6	0.3%					1.1%		1.4%
	7							0.5%	0.5%
	TOTAL	81.9%	7.5%	0.1%	5.6%	2.2%	1.5%	1.1%	100.0%

## 4.2 Cross Tabs of Profile Characteristics

From a further manipulation of the survey data it is possible to build a more exact workforce profile for the KIS, thus allowing the multi-purpose work journey to be better understood.

## Age &amp; Gender

It is generally expected that the proportion of males, when compared to females, is higher for some age brackets due to the different constraints placed upon them at various stages of the life cycle. For the KIS workforce, this difference in the age breakdown between males and females is clearly apparent (Table 8). Of all the male respondents, 76.0% were over the age of 30 years, while only 61.4% of female respondents were found to be that age grouping.

Table 8

Age and Gender Distribution of the KIS Workforce

	UNDER 20	20-30	30-40	OVER 40	NOT STATED	TOTAL
MALE	2.4%	20.0%	31.0%	45.0%	1.7%	100.0%
FEMALE	1.8%	35.1%	32.5%	28.9%	1.8%	100.0%
TOTAL	2.4%	23.9%	32.0%	36.7%	5.0%	100.0%

This points to the males in the KIS workforce being somewhat older than the females, a factor which is confirmed when both genders are considered across the 20 to 30 years age bracket. Only 20.0% of male respondents fall into this age category, in comparison with 35.1% of female respondents. These observations are emphasised when the modal class, median, and mean ages of males and females are compared (Table 9). As indicated the modal class age group for males was 'over 40 years', but for females the modal class was '20-30 years', a difference which was supported by the finding that both the median and mean ages for males were found to be five years greater than those for females.

Table 9

The Modal Class, Median and Mean Age for KIS Workforce

	MODAL CLASS	MEDIAN	MEAN
MALE	OVER 40	39	41
FEMALE	20-30	34	36

**Age & Employment Type**

The proportion of employees in each employment category, alters across the different age brackets. Of all those surveyed who were 'under 20 years', two out of three workers were engaged in blue

collar occupations. For workers in the '20-30 years' age bracket, this pattern is reversed, with two out of three workers engaged in white collar occupations. While for those workers aged '30-40 years' five out of nine workers were engaged in white collar occupations, and this pattern is reversed for workers aged 'over 40 years' (Table 10).

Table 10

Age and Employment Distribution of KIS Workforce

	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
UNDER 20	31.6%	68.4%	0.0%	100.0%
20-30	61.5%	36.9%	1.6%	100.0%
30-40	53.8%	44.2%	2.0%	100.0%
OVER 40	46.5%	52.1%	1.4%	100.0%
NOT STATED	33.3%	61.5%	5.1%	100.0%

### Gender & Employment Type

The distribution of the surveyed workers shows that differences exist between the employment status of both genders (Table 11). Of the male survey respondents 45.3% are employed in white collar jobs, while 53.7% are employed as blue collar workers. In contrast, of all the female survey respondents, 87.7% are employed as white collar workers, and only 11.4% are employed in blue collar occupations. This shows a significant emphasis on the employment of females in white collar employment. For the respondents who failed to indicate their gender, but did indicate their occupation, an even distribution between white and blue collar employment occurred. Only 1.0% of respondents failed to indicate either gender or occupation.



Table 11

Gender and Employment Distribution of KIS Workforce

	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
MALE	45.3%	53.7%	0.9%	100.0%
FEMALE	87.7%	11.4%	0.9%	100.0%
NOT STATED	44.8%	49.3%	6.0%	100.0%

**Age, Gender & Employment Type**

When three basic characteristics, age, gender, and employment category are used to further analyse the workforce, greater delineation was identified (Table 12). The largest single grouping of male workers was those blue collar employees over 40 years; the next was white collar males over 40 years, while the third and fourth were '30-40 years' either in blue or white collar occupations. The most significant group for females was those employees who were '20-30 years' in white collar employment, followed by those who were 30-40 years. For females, 69.4% are under the age of 40 years, however, for males 53.4% fall into the same age category. This shows that males in both blue and white collar occupations are generally over 30 years, while females in white collar occupations are generally younger than those in blue collar occupations.

Table 12

**Age, Gender and Employment Profile of the KIS Workforce**

SEX	AGE	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
MALES	UNDER 20	0.7%	1.7%	0.0%	2.4%
	20-30	10.6%	9.1%	0.2%	20.0%
	30-40	14.7%	15.9%	0.4%	31.0%
	OVER 40	18.8%	25.7%	0.4%	45.0%
	NOT STATED	0.4%	1.3%	0.0%	1.7%
	TOTAL	45.3%	53.7%	0.9%	100.0%
FEMALES	UNDER 20	0.9%	0.9%	0.0%	1.8%
	20-30	34.2%	0.9%	0.0%	35.1%
	30-40	26.3%	6.1%	0.0%	32.5%
	OVER 40	24.6%	3.5%	0.9%	28.9%
	NOT STATED	1.8%	0.0%	0.0%	1.8%
	TOTAL	87.7%	11.4%	0.9%	100.0%
NOT STATED		44.8%	49.3%	6.0%	100.0%

**Residential Postcode & Age**

Some postcode areas show higher proportions of workers from some of age groupings rather than others, which may be as a result of different stages of their life cycles. For the 'under 20 years' age group 72.2% of workers come from just three postcode areas, 6167, 6168, and 6169 (Figure 4.2). This is a concentration of workers in suburbs relatively close to the KIS. However, 16.7% of workers in this age group travel from residential postcode areas north of the Swan River.

For the '20-30 years' age group, the workers are spread over a much larger area (Figure 4.3) and the three postcodes which supplied the majority of those under 20 years, now only provide 37.0% of employees. Workers travelling from areas north of the Swan River, account for 12.5% of workers aged between 20 and

30 years, while those from the prestige southern suburbs provide 13.0% of employees.

The workers aged '30-40 years' are also dispersed across a large number of postcode areas with the postcodes of 6167, 6168, 6169 and 6210 providing the largest number (Figure 4.4). These postcodes provided a similar proportion of employees as for the previous age group, while the areas north of the Swan River, 9.8%, and the prestige suburbs south of the Swan River 12.6% providing a smaller proportion of the workforce in this age bracket.

For the workforce over the age of 40 years (Figure 4.5), residential location is similar to that for employees in the 30 to 40 years age bracket for the postcodes of 6167, 6168, and 6169, while the postcodes North of the Swan River provide 11.4% of workers and the prestige suburbs South of the Swan River 10.3%.

While it was found that the areas (ordered by the number of workers) of 6169, 6168, 6167 and 6163, provide a large majority of workers across all age brackets the location of the smaller groupings of employees does alter with age.

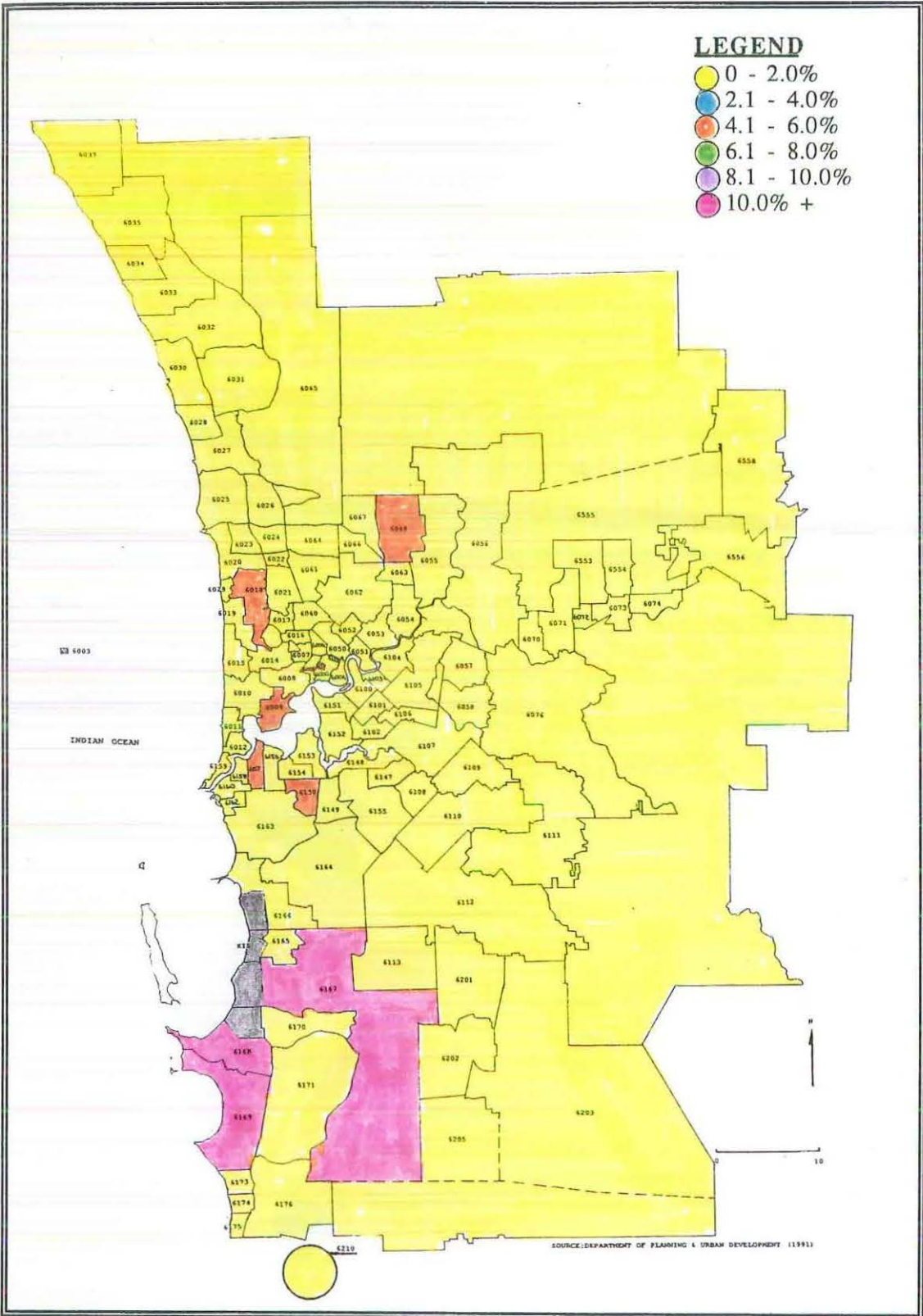
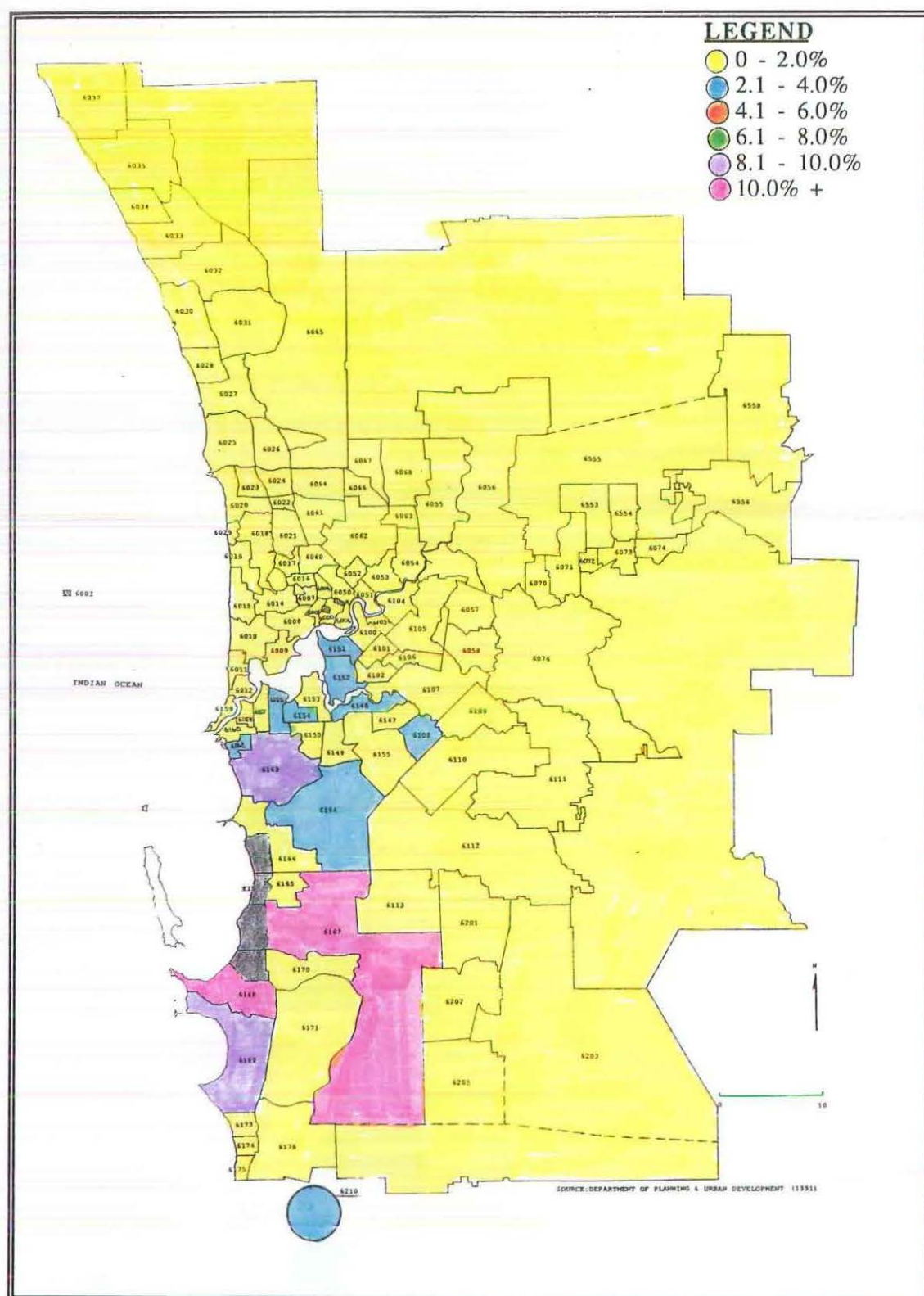


Figure 4.2: The residential location of KIS Employees under the Age of 20 Years (Source: Appendix G).



**Figure 4.3:** The residential location of KIS Employees Aged 20 to 30 Years (Source: Appendix G).



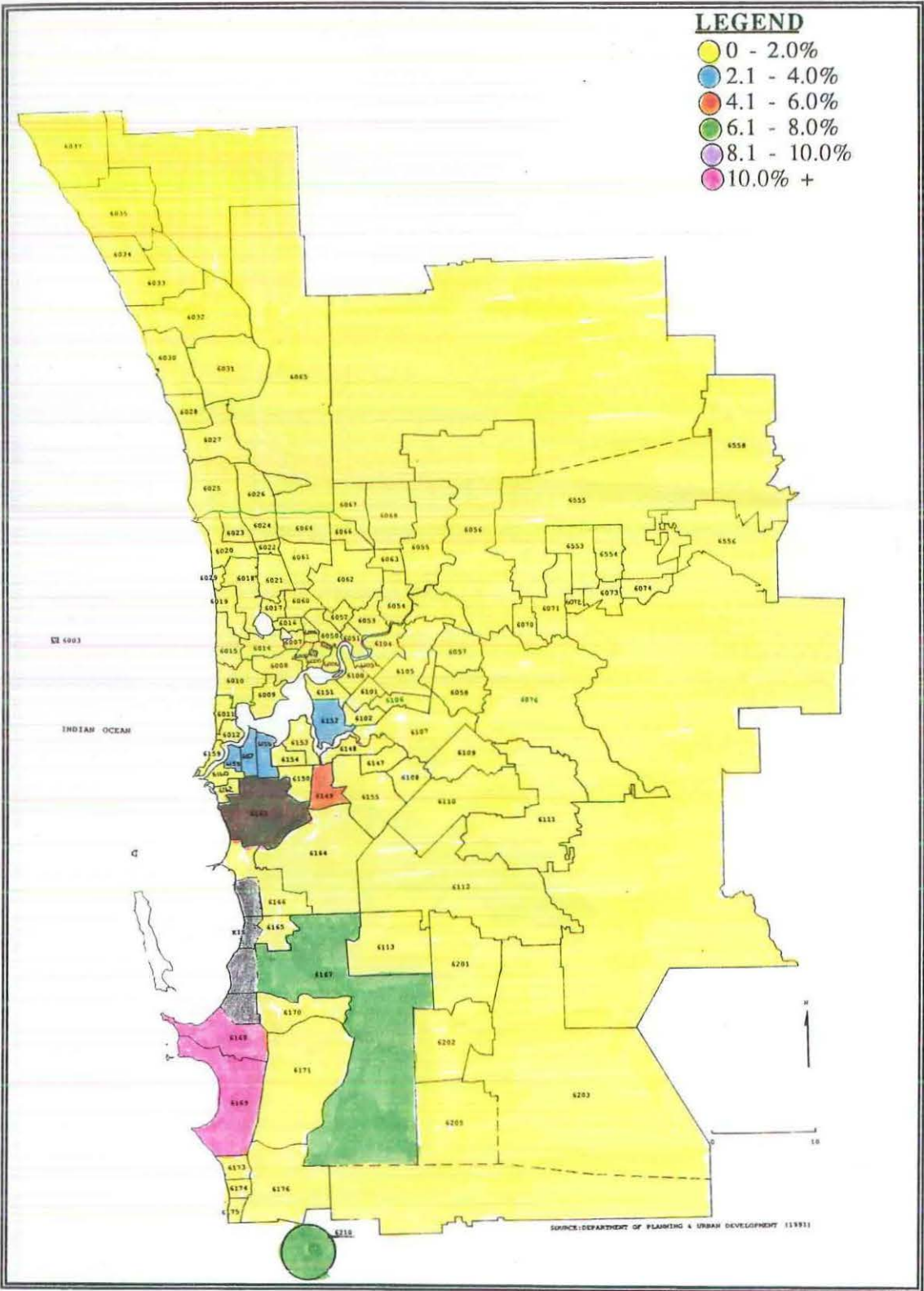


Figure 4.4: The residential location of KIS Employees Aged 30 to 40 Years (Source: Appendix G).

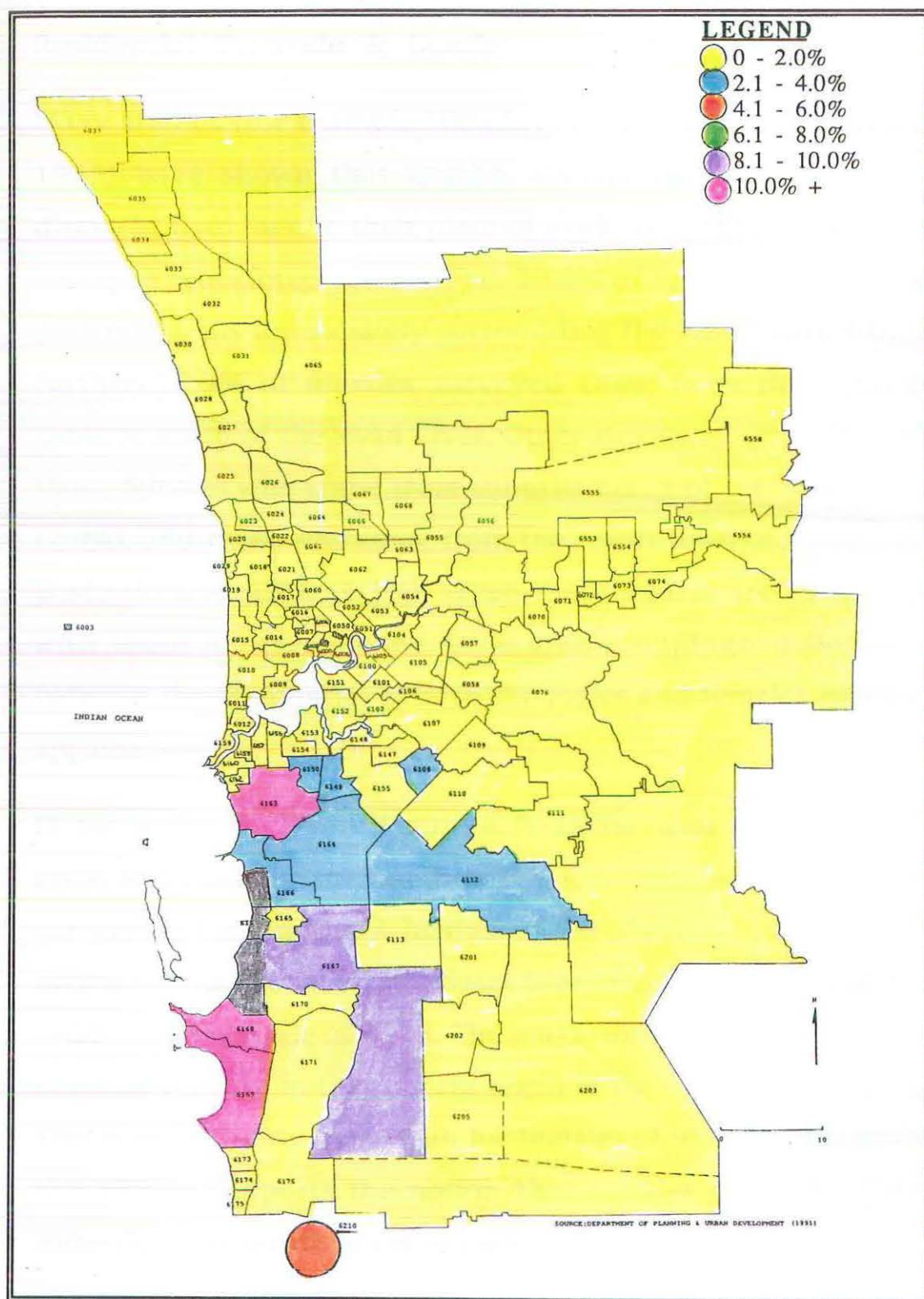


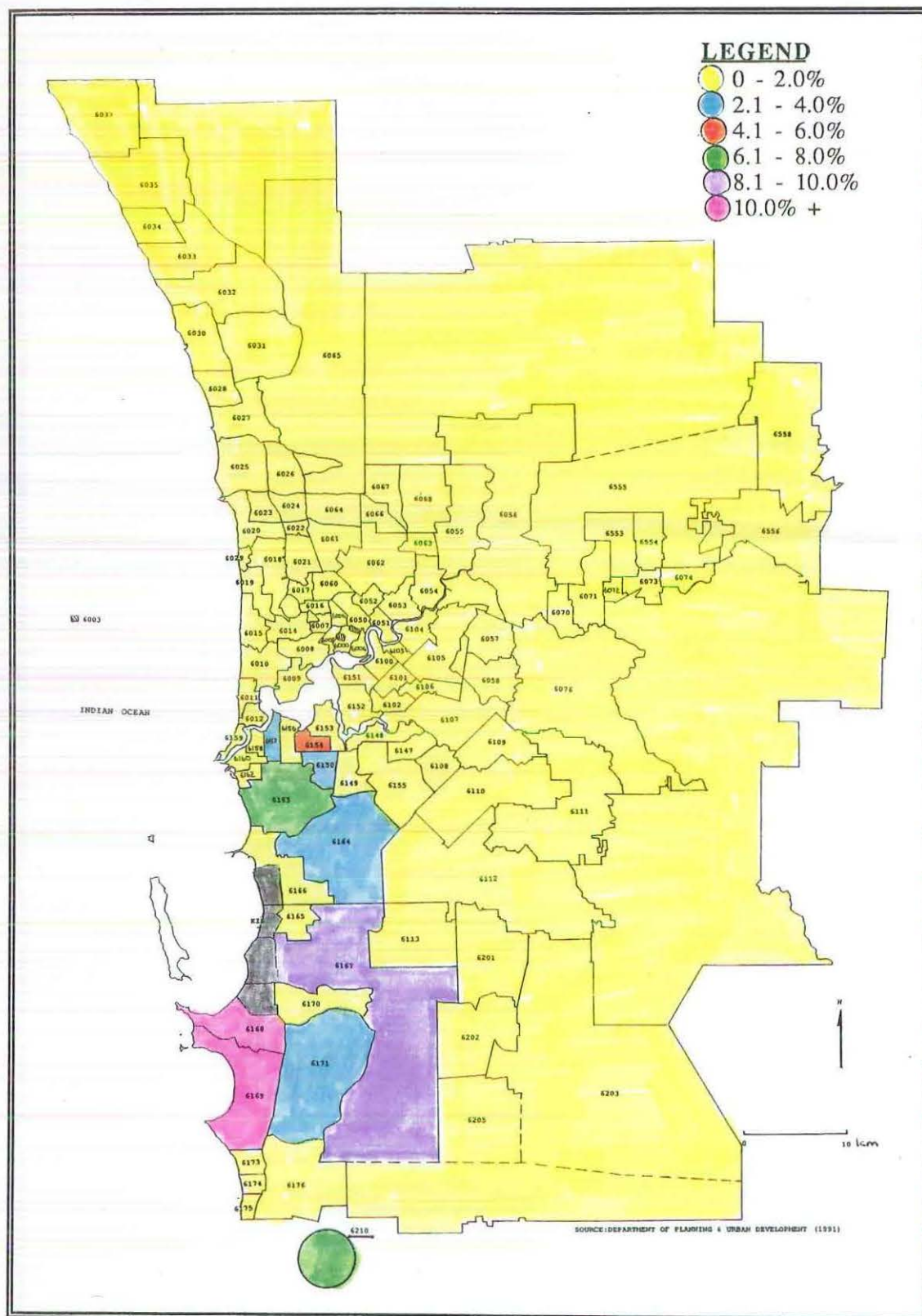
Figure 4.5: The residential location of KIS Employees Over the Age of 40 Years. (Source: AppendixG).

**Residential Postcode & Gender**

Many studies (for example Manning, 1978 and Neutze, 1971 & 1972) have shown that women, on average, travel shorter distances than men to their place of work. With this in mind, the surveyed workforce reveals that 29.8% of females lived in the postcode areas immediately surrounding the KIS (Figure 4.6). A further 12.3% of females surveyed came from the prestige suburbs south of the Swan River. Other significant groupings are those females who come from suburbs north of the Swan River (7.9%), and those who come from the resort town of Mandurah, postcode area 6210 (6.1%). When these figures are contrasted with those for men in the same area groupings differences between the residential pattern for males and females becomes apparent.

Of the males surveyed (Figure 4.7) 28.5% came from postcode areas immediately surrounding the KIS which is similar to the percentage for females. A further 11.0% of males come from the prestige suburbs south of the Swan River and 4.3% come from the residential postcode of 6210. The major difference is in the ratio of males who live in the suburbs north of the Swan River (11.9%). This is significantly more than for females (7.9%). Consequently, this survey supports the notion that females generally travel somewhat shorter distances to their places of employment.





**Figure 4.6:** The residential location of Female KIS Employees  
(Source: Appendix H).

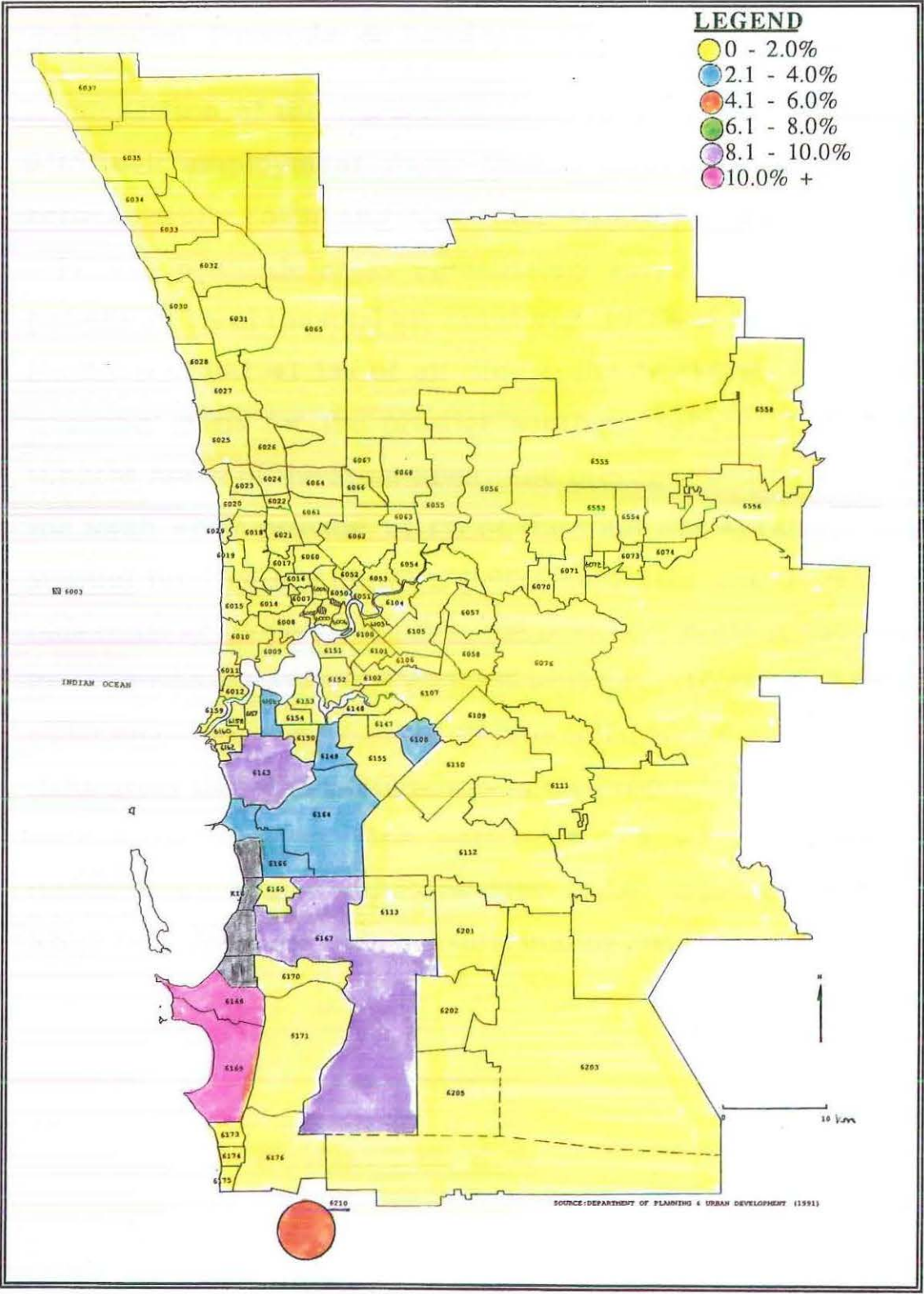


Figure 4.7: The residential location of Male KIS Employees (Source: Appendix H).

**Residential Postcode & Employment**

A comparison of the worker's residential postcodes compared with their employment status reveals significant differences between white collar and blue collar workers (Figure 4.8 and 4.9). The postcode areas immediately surrounding the KIS, provide 29.1% of the total KIS workforce (19.3% of all white collar employees and 41.1% of all blue collar workers). A reverse situation exists for the prestige southern suburbs and those suburbs north of the Swan River. The prestige suburbs south of the Swan River provide 11.1% of the total KIS workforce and account for 16.4% of all white collar employees, and 5.7% of all blue collar employees. Similarly, the postcodes north of the Swan River provide 11.3% of the total KIS workforce, 16.4% of all white collar employees, and 6.3% of all blue collar workers. Thus, both these areas show large differences in the proportion of white and blue collar workers. One postcode area which shows no differences between white and blue collar employees is 6210 which includes Mandurah and surrounding areas.



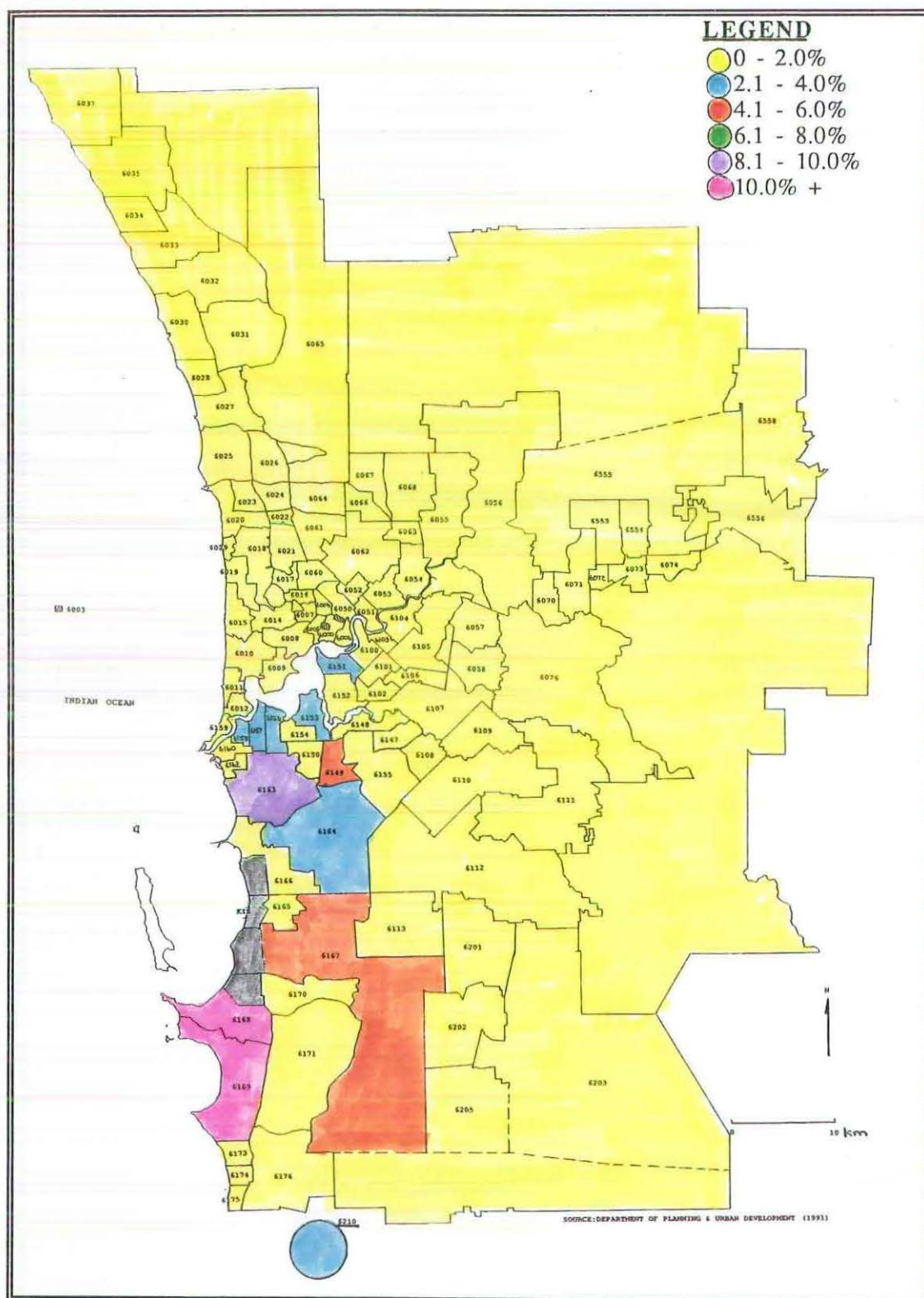
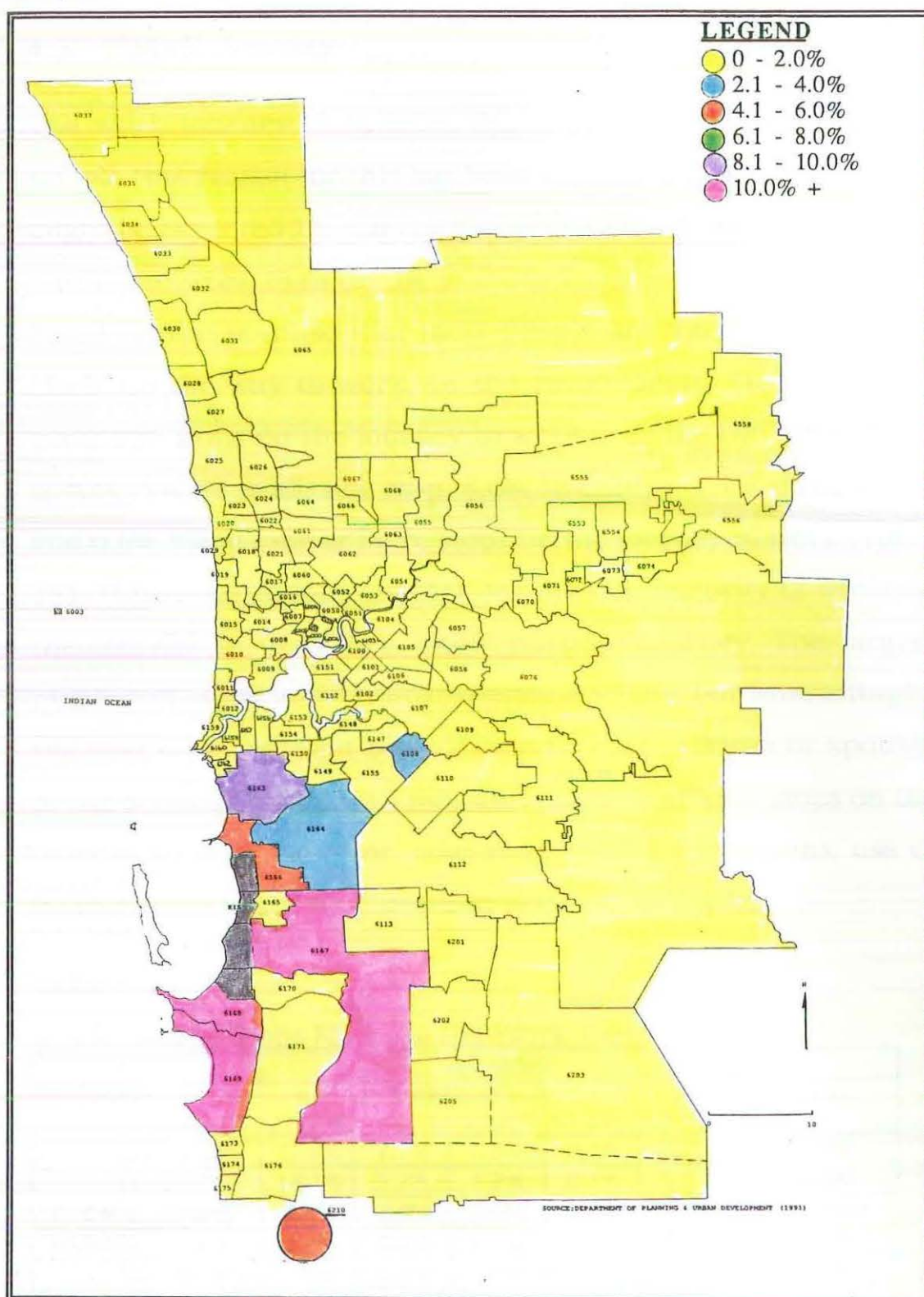


Figure 4.8: The residential location of White Collar KIS Employees (Source: Appendix I).



**Figure 4.9:** The residential location of Blue Collar KIS Employees  
(Source: Appendix I).

### 4.3 Work Journey

The work journey data from this study relates to a two day sample (the reason for this has been explained in Section 3.1). As might be expected the survey group completed less stops on the journey to work than on the journey from work, an assumption based on the premise that most people are 'racing against the clock' on the way to work. Of the respondents, 76.0% did not make any stops on the journey to work over the two days of the survey, 14.2% made one stop, 8.0% two stops, 1.1% three stops, and 0.6% made four or more stops on the journey to work (Table 13). This seems to indicate that, for the vast majority of workers, the journey to work is a single purpose journey. The largest number of stops was made at service stations; but interestingly, the next most frequent type of stop was for children or spouses or car pooling. As Table 14 indicates other significant stops on the journey to work were for, take-away food, delicatessens, use of financial and postal facilities, and work related tasks.

Table 13

Breakdown of Stops Made on the Work Journey

		TO WORK					
		NO STOPS	1 STOP	2 STOPS	3 STOPS	4+ STOPS	TOTAL
	NO STOPS	46.8%	7.7%	2.8%	0.4%	0.3%	57.9%
	1 STOP	18.1%	3.7%	1.8%	0.1%	0.0%	23.7%
FROM	2 STOPS	7.4%	2.0%	2.8%	0.4%	0.3%	12.9%
WORK	3 STOPS	2.7%	0.5%	0.3%	0.3%	0.0%	3.7%
	4+ STOPS	1.0%	0.3%	0.4%	0.0%	0.1%	1.8%
	TOTAL	76.0%	14.2%	8.0%	1.1%	0.6%	100.0%

The survey group completed almost twice as many stops on the journeys from work as the journeys to work and made a total of 546 stops over the two day survey. Once again, however, the number of employees who made stops represents only 42.1% of all respondents. Of the sample workforce 23.7% made one stop, 12.9% made two stops, 3.7% made three stops, and four or more stops accounted for 1.8% of surveyed employees. This indicates that a great number of workers use the journey from work to perform multiple functions.

Table 14

Percentage of total stops made in each category on the work journey

	JOURNEY TO WORK	JOURNEY FROM WORK
Category 1	30.5%	24.5%
Category 2	15.8%	1.8%
Category 3	10.2%	1.1%
Category 4	3.5%	17.2%
Category 5	0.7%	3.7%
Category 6	0.4%	1.8%
Category 7	5.6%	4.6%
Category 8	4.6%	3.5%
Category 9	22.5%	13.2%
Category 10	2.5%	13.4%
Category 11	1.4%	9.5%
Category 12	2.5%	5.7%
TOTAL	100.0%	100.0%

The most frequent types of stops made on journeys from work are as follows, the service station (24.5%), groceries (17.2%), hotel or social club or social activities (13.4%), children or spouses or

car pooling (13.2%), and sport or recreation (9.5%). These stops indicate a higher level a multi-functionality on the journey from work than on the journey to work.

#### **4.5 The Workforce Profile**

From all the information gathered it is possible to compile a workforce profile for the KIS. The workforce reside in areas which are generally not close to their places of employment, however, they are still relatively accessible along major road routes. Female workers are generally employed in white collar occupations, live closer to the KIS and are younger on average than their male colleagues. Conversely, male workers travel slightly further to work, are on average older and generally employed in blue collar occupations. These differences make it possible to provide an overall picture of the workforce in the KIS. The average employee does not stop on the journey to work, but may stop on the journey from work. The most common reasons for breaking the journey to work are: service stations, and family and car pooling, while for the journey from work are, service stations, groceries, social activities, family and car pooling, sport and recreation. This profile can now be used as a basis for an analysis of multi-purpose work journeys.



## Chapter 5

### Multi-Functional Work Journeys

This section is concerned with cataloguing who makes what stops on the work journey. The percentage values which are employed represent a proportion of the employees who made stops during the two day survey period.

It has been pointed out in an earlier section that work journeys are one of the most frequent journeys undertaken by metropolitan residents (Neutze, 1981, p. 122 and Logan, 1974, p. 123). Further to this, it is the premise of this research that many of these journeys are not just links between home and workplace rather, they also serve a variety of other functions according to individual needs. From this questionnaire a profile of these needs can be generated. For the two-day survey period, a total of 831 stops were made 285 on journeys to work and 546 on journeys from work (Table 13). Of the employees involved in the survey, 46.8% made no stops on the journey to or from work, conversely, 53.2% of employees made the total of 831 recorded stops (Table 15).

Table 15

Number of stops made on the work journey

	JOURNEY TO WORK	JOURNEY FROM WORK	TOTAL STOPS MADE
NUMBER OF STOPS MADE	285	546	831
% OF STOPS	34.3%	65.7%	100.0%

Table 16 shows a matrix which shows the number of stops recorded in the survey. From this, significant groupings can be identified. Table 16 shows that 34.1% of surveyed workers made no stops on the journey to work, but did make a stop on the journey from work. If this is extended to include all those who made no stops on the journey to work, but made at least one stop on the journey from work, 54.9% are involved. The next largest grouping, 14.4% was those employees who stopped on the journey to work, but made no stops on the journey from work. Hence, of all those workers who made stops on the journey to and from work, 48.5% made a total of only one stop over a two day period. This means that 215 workers made 629 stops, or 27.4% of all those surveyed accounted for 75.7% of all stops made.

Table 16

Stops Made by Employees Making Multi-Purpose Journeys

		TO					TOTAL
		NO STOPS	1 STOP	2 STOPS	3 STOPS	4+ STOPS	
	NO STOPS	-	14.4%	5.3%	0.7%	0.5%	20.9%
	1 STOP	34.1%	7.0%	3.4%	0.2%	0.0%	44.6%
FROM	2 STOPS	13.9%	3.8%	5.3%	0.7%	0.5%	24.2%
	3 STOPS	5.0%	1.0%	0.5%	0.5%	0.0%	7.0%
	4+ STOPS	1.9%	0.5%	0.7%	0.0%	0.2%	3.4%
	TOTAL	54.9%	26.6%	15.1%	2.2%	1.2%	100.0%

### 5.1 The Multi-Functional Journey To Work

For the journey to work, the total of 285 stops completed were made by only 188 of the 784 surveyed workers. This means that only 24.0% of all respondents surveyed made stops on the journey to work. Of the 285 stops made, 64.2% were completed by males, while 18.9% were by females (Table 17). Yet the percentage comparison of males to females in the surveyed workforce was 68.4% to 14.5%. As such, this indicates that females have a greater tendency than males to make stops on the journey to work.

Table 17

Gender distribution of stops made on the journey to work

	MALE	FEMALE	NOT STATED	TOTAL
NUMBER OF STOPS	185	54	46	285
% OF STOPS	64.9%	18.9%	16.1%	100.0%

The analysis of the percentage of stops made by each of the age groupings provides an indication of whether the multi-function work journey is linked to any particular stage of the 'life cycle'. This shows that the distribution of stops made is comparatively even across each of the age brackets over 20 years. However, this is not the case when the percentage of stops made by each of the age groups is compared to the percentage of workers found in each age category (Table 18). From this it can be seen that a larger proportion of workers aged 20-40 years make stops on the journey to work than do workers in the other age brackets.

Table 18

Age distribution of stops made on the journey to work

	UNDER 20 YEARS	20- 30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
NUMBER OF STOPS	5	80	99	88	13	285
% OF STOPS	1.8%	28.1%	34.7%	30.9%	4.6%	100.0%

An examination of the survey results (Table 19) shows that 54.7% of stops made were by white collar workers, and 45.3% by blue collar employees. This should be viewed in the light that of the 784 survey respondents 51.4% were found to be white collar and 46.8% blue collar employees. On this basis there could be an indication that white collar workers are more likely to complete multi-functional work journeys.

Table 19

Employment distribution of the stops made on the journey to work

	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
NUMBER OF STOPS	156	129	0	285
% OF STOPS	54.7%	45.3%	0.0%	100.0%

## 5.2 The Multi-Functional Journey From Work

The number of stops made on the journey from work was 546 and these stops were made by 330 workers. Hence, 42.1% of all workers surveyed made stops on the journey from work. Of the total number of stops made, 58.6% were made by males and 25.3% were made by females. Yet the percentage of males to

females in the survey was 68.4% against 14.5% (Table 20). This indicates a large difference in the percentage of stops made and that females may have a greater tendency to make stops on the journey from work. It is a similar, although larger, result as that for the journey to work.

Table 20

Gender distribution of stops made on the journey from work

	MALE	FEMALE	NOT STATED	TOTAL
NUMBER OF STOPS	320	138	88	546
% OF STOPS	58.6%	25.3%	16.1%	100.0%

The breakdown of stops by age bracket indicates a majority of stops are made by the older age brackets ('30-40 years' & 'over 40 years'). The percentage of surveyed workers for each of the age brackets (Table 21) when compared to the workforce profile, shows that workers in the 20-40 years age brackets are more inclined to make stops on the journey from work than those who are over 40 years or under 20 years. This repeats the pattern indicated for stops on the journey to work.

Table 21

Age distribution of the stops made on the journey from work

	UNDER 20 YEARS	20- 30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
NUMBER OF STOPS	10	138	194	184	20	546
% OF STOPS	1.8%	25.3%	35.5%	33.7%	3.7%	100.0%

The breakdown of stops made on the journey from work by employment group indicates that 61.5% of stops are made by workers employed in white collar occupations and 35.3% by those in blue collar occupations (Table 22). This is compared to 51.4% of

survey respondents being white collar workers and 46.8% being blue collar workers. This seems to indicate that white collar workers are more likely to make stops on the journey from work than those who are blue collar employees. The difference between the number of stops made on the journey from work (143) is large enough to be significant which is unlike the difference for the journey to work(27).

Table 22

Employment distribution of stops made on the journey from work

	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
NUMBER OF STOPS	336	193	17	546
% OF STOPS	61.5%	35.3%	3.1%	100.0%

### 5.3 The Stops Made On Multi-Functional Work Journeys

The categories used in this section are those identified previously in Section 3.3.

#### Analysis of Category 1 Stops

Service stations provide the most common reason to stop on the journey to work. They accounted for 30.5% of the 285 stops made on the journey to work. What is not clear, is whether respondents are just buying petrol and other car related products or if they are using multi-function service stations to purchase other items normally bought from delicatessens and general stores.

Table 23

Category 1 Stops Made on the Work Journey:(A)-Gender (B)-Age (C)-Employment

(A)	MALE	FEMALE	NOT STATED	TOTAL
JOURNEY TO WORK	57.5%	23.0%	19.5%	100.0%
JOURNEY FROM WORK	72.4%	15.7%	11.9%	100.0%

(B)	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
JOURNEY TO WORK	1.1%	31.0%	42.5%	23.0%	2.3%	100.0%
JOURNEY FROM WORK	3.0%	26.1%	34.3%	33.6%	3.0%	100.0%

(C)	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
JOURNEY TO WORK	60.9%	39.1%	0.0%	100.0%
JOURNEY FROM WORK	65.7%	32.8%	1.5%	100.0%

A review of these results provides a profile of the respondents who are adding this function to their work journey. Of the 87 survey respondents who made this type of stop, 57.5% were male and 23.0% female (Table 23A). This represents a slightly different proportion to the percentage breakdown of males and females in the workforce which was 68.4% to 14.5%. As one would expect, both genders require fuel for their mode of transport, which is overwhelmingly the private motor vehicle.

Across the age groupings, 73.6% of workers who made this category of stop were aged between 20 and 40 (Table 23B). Yet only 55.9% of the 784 survey respondents belonged to this age grouping. Thus a higher proportion of workers in the 20 to 40

years age grouping make this type of stop compared to the other age brackets. By further data extraction (Appendix J) it was found that 41.4% of employees who make this type were males aged between 20 and 40 years.

The tabulation of the number of stops made by either employment group shows that, white collar employees made 60.9% of the stops at service stations and 39.1% were made by blue collar respondents (Table 23C). This is compared to 51.4% of the 784 survey respondents being white collar workers and 46.8% being blue collar workers. However, this may be related to the finding in the survey that white collar employees live slightly further away from the KIS than blue collar workers and hence they would require more frequent purchases of fuel than the employees who live closer.

The survey shows that the residential location of workers is a significant factor in who makes the most use of service stations. For those 87 survey respondents who made stops, 18.4% were made by workers travelling from postcode areas north of the Swan River, 19.5% were made by workers travelling from the prestige areas south of the Swan River, and only 13.8% were made by residents of the postcodes immediately surrounding the KIS, even though they provide 29.2% of the workforce surveyed.

Service stations account for 24.5% of the 546 stops made on the journey from work by the 784 surveyed workers. This is a smaller percentage of total stops than that for the journey to work, but does represent almost a 50% increase in actual



numbers of stops made (from 87 to 134). Of these stops made, 72.4% were by males, and only 15.7% by females (Table 23A). These percentages are very similar to the male/female division in the 784 employees surveyed. They do however differ from the journey to work percentages. The reason for the difference may be linked to the other responsibilities which females may have on the journey from work. These could include household shopping and other domestic functions. No particular age grouping makes a higher proportion of stops than any other (Table 23B). When the employment grouping of the employees is considered, 65.7% of the 134 stops were made by white collar employees (Table 23C). Further analysis of the survey data shows that the largest single group of workers were white collar males who accounted for 44.8% of stops.

The residential location of the workers who made stops at service stations on the journey from work is evenly spread over the metropolitan area. Those employees from postcode areas north of the Swan River made 17.2% of the 134 stops. The southern prestige areas provided employees who were responsible for 17.9% of the stops made. Both these residential areas provide approximately 11% each of the surveyed KIS workforce yet account for a much larger proportion of this type of stop. In contrast, the areas surrounding the KIS which provide 29.2% of the 784 surveyed workers, account for only 19.4% of the stops made at service stations. From these results, combined with those on the journey to work, it is possible to recognise that a

relationship between residential location and whether an employee stops at a service station may exist.

### Analysis of Category 2 Stops

Delicatessens and take away food outlets account for 15.8% of the 285 stops made on the journey to work. This may provide an indication that there is either a lack of these services within easy access of the workplace or that the free time available to the employee during work hours precludes them leaving the workplace and therefore the employee needs to make this stop on the way to work.

Table 24

#### Category 2 Stops Made on the Work Journey:

##### (A)-Gender (B)-Age (C)-Employment

(A)	MALE	FEMALE	NOT STATED	TOTAL
JOURNEY TO WORK	77.8%	6.7%	15.6%	100.0%
JOURNEY FROM WORK	70.0%	10.0%	20.0%	100.0%

(B)	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
JOURNEY TO WORK	2.2%	22.2%	40.0%	22.2%	13.3%	100.0%
JOURNEY FROM WORK	0.0%	40.0%	30.0%	10.0%	20.0%	100.0%

(C)	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
JOURNEY TO WORK	28.9%	71.1%	0.0%	100.0%
JOURNEY FROM WORK	40.0%	60.0%	0.0%	100.0%

Of all the survey respondents making this category of stop 72.7% were male, and only 6.7% were female (Table 24A). This represents a higher proportion of males than in the male/female division in the surveyed workforce. Thus males, it would appear are more likely to make this type of stop than females.

The percentage breakdown of employment status show that 28.9% of the 45 workers surveyed who stopped at delicatessens or takeaway food outlets were white collar employees and 71.1% were blue collar (Table 24C). This is compared to 51.4% of the 784 survey respondents being white collar workers and 46.8% being blue collar workers. This may indicate that blue collar workers are more likely to make this type of stop. However, further data extraction (Appendix J) shows that 57.8% of the 45 stops were made by blue collar males. Yet this segment only constitutes 36.7% of the 784 surveyed workers. From this information it would seem that blue collar males are most likely to make this type of stop on their work journey. Of the 45 stops made, 22.2% were made by workers travelling from the postcode areas immediately surrounding the KIS and 31.1% were made by workers travelling from suburbs north of the Swan River.

On the journey from work, delicatessens and take away food outlets account for only 1.8% of the 546 stops made by survey respondents. This is a significant difference from the 15.8% of the 285 stops on the journey to work. The difference is a reduction from 29 stops on the journey to work compared with 10 on the

journey from work. This would seem to indicate that this function is more important on the journey to work for employees.

### Analysis of Category 3 Stops

Newsagents and video shops account for 10.2% of the 285 stops made on the journey to work.

Table 25

#### Category 3 Stops Made on the Work Journey:

##### (A)-Gender (B)-Age (C)-Employment

(A)	MALE	FEMALE	NOT STATED	TOTAL
JOURNEY TO WORK	79.3%	6.9%	13.8%	100.0%
JOURNEY FROM WORK	33.3%	50.0%	16.7%	100.0%

(B)	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
JOURNEY TO WORK	0.0%	13.8%	31.0%	48.3%	6.9%	100.0%
JOURNEY FROM WORK	0.0%	0.0%	16.7%	66.7%	16.7%	100.0%

(C)	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
JOURNEY TO WORK	58.6%	41.4%	0.0%	100.0%
JOURNEY FROM WORK	66.7%	33.3%	0.0%	100.0%

From the survey it was found that this type of stop was made five times more frequently on the journey to work than on the journey from work, 29 stops against 6. Of the 29 stops made, 79.3% were made by males, and 48.3% by workers over the age of 40 years (Table 25 A and B). On the journey to work this stop

was mainly performed by white collar males who completed 48.3% of all stops. The residential location of the workers who made this stop was concentrated north of the KIS but south of the Swan River (not including the Southern prestige suburbs). This residential area conglomerate accounted for 41.4% of stops made for this purpose.

Newsagents and video shops only account for 1.1% of all stops made on the journey from work compared with 10.2% of stops on the journey to work. As already indicated, this type of stop is five times more frequent on the journey to work. It could also reflect that the hiring of video cassettes is a household decision and not one made by the employee on the journey from work.

#### Analysis of Category 4 Stops

Workers in the survey group made this type of stop very infrequently on the journey to work. Groceries only account for 3.5% of the 285 stops made on the journey to work. Only 10 stops in total were made over a two day period. Of these ten stops made, nine were made by males. However, as the number of stops made is so low it is difficult to draw any firm conclusions. However, groceries account for 17.2% of the 546 stops made on the journey from work by survey respondents. This is a significant increase on the 3.5% who make stops for groceries on the journey to work. For those workers who made this stop, 50.0% were females and 37.2% males (Table 26A). However, this is not an unexpected difference as social and domestic

responsibilities may still be stereotyped amongst this male-dominated workforce.

Table 26

Category 4 Stops Made on the Work Journey:

(A)-Gender (B)-Age (C)-Employment

(A)	MALE	FEMALE	NOT STATED	TOTAL
JOURNEY TO WORK	90.0%	10.0%	0.0%	100.0%
JOURNEY FROM WORK	37.2%	50.0%	12.8%	100.0%

(B)	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
JOURNEY TO WORK	0.0%	20.0%	20.0%	60.0%	0.0%	100.0%
JOURNEY FROM WORK	0.0%	23.4%	33.0%	40.4%	3.2%	100.0%

(C)	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
JOURNEY TO WORK	60.0%	40.0%	0.0%	100.0%
JOURNEY FROM WORK	68.1%	26.6%	5.3%	100.0%

The distribution of stops by age groupings reflects the male/female (Table 26B) divisions which exist in the surveyed workforce. These factors account for the high proportion of white collar employees responsible for stopping to perform this function on the work journey, 68.1% of the 94 stops made (Table 26C). White collar females performed 43.6% of the 94 stops made on the journey from work. This was the largest single workforce group to complete this type of stop. The residential locations of the workers who made this type of stop were spread over the

metropolitan area in similar proportions to that exhibited by the survey group. Thus residential location does not seem to influence the employees who make this stop.

### Analysis of Category 5 Stops

This category incorporates other retail opportunities not already covered (eg. chemist, furniture) and only accounts for 0.7% of all stops made on the journey to work.

Table 27

#### Category 5 Stops Made on the Work Journey:

##### (A)-Gender (B)-Age (C)-Employment

(A)	MALE	FEMALE	NOT STATED	TOTAL
JOURNEY TO WORK	100.0%	0.0%	0.0%	100.0%
JOURNEY FROM WORK	45.0%	30.0%	25.0%	100.0%

(B)	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
JOURNEY TO WORK	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
JOURNEY FROM WORK	5.0%	35.0%	40.0%	20.0%	0.0%	100.0%

(C)	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
JOURNEY TO WORK	50.0%	50.0%	0.0%	100.0%
JOURNEY FROM WORK	70.0%	20.0%	10.0%	100.0%

This stop type was insignificant on the journey to work as a total of only 2 stops were made over a two day period by the 784 surveyed workers.

On the journey from work this stop type accounts for 3.7% of the 546 stops made. Although this represents a small percentage increase on the number of stops made on the journey to work it is a ten-fold increase in total of stops (ie. from 2 to 20). Still, this stop performs a relatively small function on the journey from work. Of those who made this stop, 85.0% were aged between 20 and 40 years, and 70.0% were white collar employees (Table 27). Further analysis (Appendix x) shows that 35.0% of stops were performed by white collar males, and 25.0% by white collar females. These were the two most significant groupings who performed this type of stop.

#### Analysis of Category 6 Stops

This category includes all professional services (eg. doctor, dentist, lawyer) and accounts for only 0.3% of the 285 stops made on the journey to work. Hence this type of stop was insignificant on the journey to work, as only 1 stop was made over a two day period by the 784 surveyed workers.



Table 28

Category 6 Stops Made on the Work Journey:(A)-Gender (B)-Age (C)-Employment

(A)	MALE	FEMALE	NOT STATED	TOTAL
JOURNEY TO WORK	100.0%	0.0%	0.0%	100.0%
JOURNEY FROM WORK	30.0%	60.0%	10.0%	100.0%

(B)	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
JOURNEY TO WORK	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
JOURNEY FROM WORK	0.0%	20.0%	30.0%	50.0%	0.0%	100.0%

(C)	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
JOURNEY TO WORK	100.0%	0.0%	0.0%	100.0%
JOURNEY FROM WORK	70.0%	30.0%	0.0%	100.0%

However, on the journeys from work, this category accounts for 1.8% of the 546 stops made. This is an increase from, 1 stop on the journey to work, to 10 stops on the journeys from work. However, this is still a small percentage of the total number of stops. The frequency with which employees may make use of these services should be taken into account. Many people would only use professional services once or twice during an entire year and hence this low number of stops should be expected.

### Analysis of Category 7 Stops

Of the 285 stops made on the journeys to work, this category accounted for 5.6% and incorporates all personal financial, postal and business matters. It is interesting to note that 62.5% of these stops were made by workers who were aged '20-30 years,' and 81.2% by white collar employees (Table 29). However, 56.2% of these stops were made by white collar females (which is 100% of all female stops of this type). These stops were also made totally by workers who came from residential locations south of the Swan River (Appendix ?).

Table 29

#### Category 7 Stops Made on the Work Journey:

##### (A)-Gender (B)-Age (C)-Employment

(A)	MALE	FEMALE	NOT STATED	TOTAL
JOURNEY TO WORK	37.5%	56.3%	6.3%	100.0%
JOURNEY FROM WORK	32.0%	56.0%	12.0%	100.0%

(B)	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
JOURNEY TO WORK	0.0%	62.5%	0.0%	37.5%	0.0%	100.0%
JOURNEY FROM WORK	0.0%	36.0%	32.0%	32.0%	0.0%	100.0%

(C)	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
JOURNEY TO WORK	81.3%	18.8%	0.0%	100.0%
JOURNEY FROM WORK	88.0%	8.0%	4.0%	100.0%

This category, which incorporates all personal financial, postal and business matters accounts for 4.6% of the 546 stops made on the journey from work. However, this represents an increase of approximately 50% in the number of stops made on the journey to work (ie. from 16 to 25). Of the workers who made these stops, 56.0% were females, and 88.0% were white collar employees. Workers aged between '20-30 years' made 36.0% of the 25 stops for these functions (Table 29). These results are not as extreme as those for the journey to work, but they still show that this type of stop is performed most often by white collar females (52.0% of the 25 stops made). Residential location does not appear to influence the number of workers who make this type of stop.

#### Analysis of Category 8 Stops

Work related functions account for 4.6% of the 285 stops made on the journey to work. However, 92.3% of the 13 stops made were by white collar males and 53.8% by white collar males aged over 40 years, while an insignificant number (1) by females (Table 30). The residential location for these workers was generally south of the Swan River, as this residential conglomerate accounted for 87.5% of stops made. The total number of stops (13) was however quite small and it is very difficult to draw any firm conclusions.

Table 30

Category 8 Stops Made on the Work Journey;(A)-Gender (B)-Age (C)-Employment

(A)	MALE	FEMALE	NOT STATED	TOTAL
JOURNEY TO WORK	92.3%	7.7%	0.0%	100.0%
JOURNEY FROM WORK	36.8%	52.6%	10.5%	100.0%

(B)	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
JOURNEY TO WORK	0.0%	15.4%	30.8%	53.8%	0.0%	100.0%
JOURNEY FROM WORK	5.3%	31.6%	42.1%	21.1%	0.0%	100.0%

(C)	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
JOURNEY TO WORK	100.0%	0.0%	0.0%	100.0%
JOURNEY FROM WORK	100.0%	0.0%	0.0%	100.0%

On the journey from work, work related functions account for 3.5% of the 546 stops made. This represents very little percentage difference for the number of stops made between the journey to and from work. However, the type of employee who makes this type of stop does differ. Of the 19 stops made, 52.6% were made by white collar females and 78.9% of the stops by workers under the age of 40 years. As for the journey to work, these stops are made almost totally by residents coming from residential locations south of the Swan River. The journey from work then, must perform different work related functions to those on the journey to work. Different groups of workers are

performing these tasks on the journey from work when compared to the journey to work.

### **Analysis of Category 9 Stops**

This stop category includes workers who drop off children and spouses on the journey to work as well as those who pick up passengers in a car pool. Stops of this type account for 22.5% of the 285 stops made on the journey to work. Males were responsible for completing 54.7% of these stops while females made 20.3%. However, 56.2% of the 64 stops are made by workers engaged in blue collar occupations, while 43.7% were made by white collar employees. However, 42.2% of the 64 stops made were by blue collar males and 20.3% by white collar females. These were the two largest grouping of workers who make this type of stop. Workers in the 30-40 age group account for 35.9% of the 64 stops made, while those 20-40 years account for 62.5%. The workers who make this type of stop are generally from the suburbs south of the Swan River and account for 75.0% of these stops made. From this information it is possible to see that this type of stop is not related to any particular workforce characteristic and is made across the entire workforce.

Table 31

Category 9 Stops Made on the Work Journey;(A)-Gender (B)-Age (C)-Employment

(A)	MALE	FEMALE	NOT STATED	TOTAL
JOURNEY TO WORK	54.7%	20.3%	25.0%	100.0%
JOURNEY FROM WORK	61.1%	23.6%	15.3%	100.0%

(B)	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
JOURNEY TO WORK	4.7%	26.6%	35.9%	28.1%	FALSE	100.0%
JOURNEY FROM WORK	5.6%	22.2%	34.7%	33.3%	4.2%	100.0%

(C)	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
JOURNEY TO WORK	43.8%	56.3%	0.0%	100.0%
JOURNEY FROM WORK	54.2%	44.4%	1.4%	100.0%

On the journey from work this category of stop accounted for 13.2% of the 546 stops made. This however is an increase on the number of stops made on the journey to work from 64 to 72. The increase in stops, though small on the journey from work may indicate a sharing of the responsibility for these functions between workers and/or spouses. Of the 72 stops made, 61.1% were by males and 23.6% by females. Workers who were aged 20-40 years accounted for 56.9% of the 72 stops made, which is a smaller proportion than on the journey to work. Of the 72 stops made, 54.2% were made by white collar employees, and 44.45 by blue collar workers. This is the reverse of the findings for the

journey to work where blue collar workers were more prominent. The largest single group of workers who made this type of stop were the blue collar males who made 43.7% of the 72 stops, which is similar to the findings on the journey to work.

### Analysis of Category 10 Stops

This category includes hotels, social clubs, TAB, bottle shops and social activities (which includes visiting family and friends) and accounts for 2.5% of the 285 stops made on the journey to work. However, only seven stops were made by the 784 surveyed workers over a two day period, so there is insufficient data to produce any conclusive patterns for this type of stop.

Table 32

#### Category 10 Stops Made on the Work Journey:

##### (A)-Gender (B)-Age (C)-Employment

(A)	MALE	FEMALE	NOT STATED	TOTAL
JOURNEY TO WORK	57.1%	42.9%	0.0%	100.0%
JOURNEY FROM WORK	71.2%	5.5%	23.3%	100.0%

(B)	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
JOURNEY TO WORK	0.0%	42.9%	14.3%	42.9%	0.0%	100.0%
JOURNEY FROM WORK	0.0%	21.9%	38.4%	34.2%	5.5%	100.0%

(C)	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
JOURNEY TO WORK	57.1%	42.9%	0.0%	100.0%
JOURNEY FROM WORK	30.1%	67.1%	2.7%	100.0%

On the journey from work this category accounts for 13.4% of the 546 stops made, which is a significant increase on the 2.5% made on the journey to work. It is expected that the types of activities covered by this category are more prevalent after work than before it.

Of the 73 stops made 71.2% were made by males and only 5.5% by females. This is a large difference when compared to the male/female division of the surveyed workforce. Another significant characteristic is that the workers who make this stop are largely over the age of 30 years (72.6% of the 73 stops made). Workers who are engaged in blue collar occupations also made 67.1% of the 73 stops. These characteristics show that this type of stop is dominated by the older male segment of the workforce. This may be related to the worker's life cycle, in that the younger workers also have young families at home. Also 37.0% of the workers who make this type of stop come from residential postcode areas which surround the KIS and hence have the shortest distance to travel on their work journeys (Appendix M).

### Analysis of Category 11 Stops

Sporting and recreational activities account for 1.4% of the 285 stops made on the surveyed journeys to work. However, only four stops were made by the 784 surveyed workers over a two day period and so again I am unable to point to any conclusive patterns for this category.



Table 33

Category 11 Stops Made on the Work Journey:(A)-Gender (B)-Age (C)-Employment

(A)	MALE	FEMALE	NOT STATED	TOTAL
JOURNEY TO WORK	75.0%	0.0%	25.0%	100.0%
JOURNEY FROM WORK	73.1%	7.7%	19.2%	100.0%

(B)	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
JOURNEY TO WORK	0.0%	75.0%	0.0%	25.0%	0.0%	100.0%
JOURNEY FROM WORK	0.0%	28.8%	44.2%	21.2%	5.8%	100.0%

(C)	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
JOURNEY TO WORK	50.0%	50.0%	0.0%	100.0%
JOURNEY FROM WORK	59.6%	32.7%	7.7%	100.0%

However, sporting and recreational activities accounted for 9.5% of the 546 stops on the journeys from work. This is a significant increase on the number of stops made on the journey to work (from 4 to 52). Significantly, 73.1% of workers making this type of stop are male and only 7.7% are female (Table 33). This large difference is similar to that exhibited for the previous type of stop. Workers aged between 20-40 years accounted for the 73.1% of the 52 stops made for this purpose. It is hardly surprising that younger workers are involved in sporting activities, while the older workers are involved in other less physical social activities (as identified in the previous type of stop). Of the workers who

make this type of stop 59.6% are engaged in white collar employment and 32.7% in blue collar employment. As expected, white collar males make 46.1% of the 52 stops and are the largest section of the workforce to make this type of stop. Residential location also seems to influence the number of stops made, only 13.5% of stops were made by residents of the areas immediately surrounding the KIS, while 28.8% were made by workers who live in areas north of the Swan River. This could be because workers who live in the areas surrounding the KIS travel home before making a single purpose trip to participate in sporting and recreational activities.

#### Analysis of Category 12 Stops

This category includes stops at hairdressers, beauticians, car dealers, automotive repairers etc. and accounts for 2.5% of all stops made on the journey to work. However, only seven stops were made by the 784 surveyed workers over a two day period so I am unable to point to any conclusive patterns for this type of stop.

Table 34

Category 12 Stops Made on the Work Journey:(A)-Gender (B)-Age (C)-Employment

(A)	MALE	FEMALE	NOT STATED	TOTAL
JOURNEY TO WORK	71.4%	28.6%	0.0%	100.0%
JOURNEY FROM WORK	58.1%	16.1%	25.8%	100.0%

(B)	UNDER 20 YEARS	20-30 YEARS	30-40 YEARS	OVER 40 YEARS	NOT STATED	TOTAL
JOURNEY TO WORK	0.0%	28.6%	57.1%	14.3%	0.0%	100.0%
JOURNEY FROM WORK	0.0%	19.4%	32.3%	48.4%	0.0%	100.0%

(C)	WHITE COLLAR	BLUE COLLAR	NOT STATED	TOTAL
JOURNEY TO WORK	71.4%	28.6%	0.0%	100.0%
JOURNEY FROM WORK	71.0%	29.0%	0.0%	100.0%

This category accounts for 5.7% of the 546 stops made on the journey from work, which represents an increase of over four-fold in the number of stops made when compared to the journey to work (ie. from 7 to 31). However, due to the diverse nature of functions which this category encompasses it is difficult to discuss any patterns which may exist. For the 31 stops made, 58.0% were made by males and only 16.1% by females (Table 34). The workers aged over 30 years accounted for 80.6% of the 31 stops made and 71.0% of the workers who made this stop

were white collar employees. Of those workers who made this type of stop the large majority came from suburbs south of the Swan River.

#### 5.4 The Profile Of The Multi-Functional Work Journey

In summary, the workforce of KIS use the work journey as an opportunity to combine several single purpose trips into one multi-purpose journey, thus achieving considerable savings in time and possibly money and effort. Although it may be that some of these, such as petrol and lunch orders, may be work related necessities..

While employees from KIS appear to use both the journey to and from work for multi-purpose trips, it is the journey after the completion of the working day which shows a greater degree of multi-functionality. The most common multi-functional work journey was that which performed one other function, though this accounted for only 48.4% of these trips, the majority of those being conducted on the journey from work. The most common reason for breaking the work journey was to stop at service stations (26.6% of all stops made), the second is for children, spouses and car pools (16.4%), and the third for groceries (12.5%), of which 11.3% were made on the journey from work.

Females made 23.1% of all the stops made on work journeys, while males made 60.8% yet they account for 14.5% and 68.4% of the workforce respectively. This tendency for females to be more inclined to perform multi-purpose work journeys may be related

to other responsibilities (maybe household) which diminish their available free time. The tendency to perform multi-functional work journeys is evenly spread across the various age brackets with the percentage of stops made by each age bracket reflecting the proportion of the workforce each grouping covers.

White collar employees exhibited a greater propensity for multi-purpose work journeys, making 59.2% of stops yet they comprise by 51.4% of the workforce while blue collar workers make 38.7% of stops and constitute 46.8%. This may be due to the differing work hours for each group, nine to five verses shift work.

Some types of stops were performed more by various segments of the workforce. Grocery stops were performed 46.1% of the time by females; 14.5% of the workforce. Hotels, TAB's etc stops were mainly performed by blue collar employees, 65.0%, who comprise only 46.8% of the workforce. In contrast, 58.9% of stops for sport and recreation are made by white collar employees, 51.4% of KIS workers. Residential location also plays a part in the multi-functional work journey, with stops at hotels, social clubs etc. performed more by employees from the suburbs surrounding KIS than those further away. While sport and recreation stops are performed more often by employees who do not come from the suburbs close to KIS as well as stops at service stations.

These findings indicate that although the work journey tends to be multi-functional the type of stops depends very much on the characteristics of the person breaking the journey, a matter

which requires consideration when assessing the implications of multi-purpose work journeys for retail trade and public transport.

## Chapter 6

### Discussion

#### 6.1 Research Findings

The separation of home and workplace has led to the work journey becoming the most important transport linkage in urban society. Neutze (1981, p. 123) found that people appeared to be willing to travel considerable distances to work, often opting for a better perceived residential address, to the detriment of the time taken to complete the work journey. The multi-purpose work journey is the result of the pressures which all urban residents experience as the daily chore of commuting has consumed ever increasing portions of people's lives.

For some of the employees surveyed, the work journey remains a single purpose trip, for others it assumes a multi-functional purpose, not everyday, but on several occasions during the working week. The type of other functions which the work journey assumes were also found to alter depending on the

characteristics of the employee, such as age, gender, employment type, and residential location.

Differences also exist between the journey to work and the journey from work. The trip to work, is for many employees, still a single purpose trip, with over 75% not making any stops over a two day period. For those who did make stops, over 50% could be classified as being work related reasons such as service stations, delicatessens, take away food, newsagents, and for external work appointments. However, the journey from work, has over 40% of the surveyed employees making a multi-purpose trip (over a two day period), with stops which are more related to household and social needs such as hotels, social clubs, groceries, professional services, sport and recreation.

This combination of several single purpose trips into a multi-purpose work journey has occurred across the entire sample workforce although the types of functions performed do alter for different employee characteristics. Furthermore, some types of stops are more likely to be made by specific segments of the workforce.

Gender differences occur when household related tasks are the reason for performing a multi-purpose journey. Females are more likely to make stops on the way from work. These include work related tasks, groceries, personal business, children, spouses and car pools. While males are more likely to make stops on the way to work for work tasks, sport or recreation, and a range of social stops. An example of this would be that of all



stops made for personal business matters, 56.1% were by females, yet they account for 14.5% of the surveyed workforce.

Age also plays a part in creating differences in the types of multi-functional work journeys. Stops which attract a younger section of the workforce are sport and recreation, personal business matters, and children, spouses and car pools. While the older segment performs a greater proportion of stops for social related activities, groceries and the 'other' category of stops. An example of the significance of age is that employees aged 20-30 years, while comprising 23.8% of the workforce profiled, performed 46.3% of all stops for personal business.

Occupation also causes differences in the multi-purpose journey profile for employees. White collar workers are more likely to make stops related to work, newsagents, groceries, personal business, sport and recreation, and the 'other' category. Blue collar employees however, tend to make a greater proportion of stops which relate to social functions and to stop for takeaway food on the way to work. An example of employment differences is 100% of work related stops were made by white collar employees, while 69.1% of stops at delicatessens and takeaway food outlets were made by blue collar employees.

Residential location also played a part in creating differences in the multi-purpose journey profile, in two ways, firstly the distance involved and secondly the locality. Employees who travel similar distances to the KIS but from different directions,

make different proportions of stops. For example, workers in Kwinana are more likely to make stops than those from Rockingham, while those in the Safety Bay area are likely to make more stops than those from the Spearwood area. This could be caused by the retail and service opportunities which may or may not exist along the major traffic routes to the KIS. Other stops are made by workers who come from suburbs which are further away. An example is stops for sport and recreation, groceries and children, spouses or car pooling, are generally made by employees from residential areas which are some distance from KIS. While stops for social activities, and takeaway food on the way to work, are made by a greater proportion of employees from suburbs close to KIS.

Yet one factor remains constant across each of these employee characteristics, the use of multi-purpose work journeys to accomplish the required functions within the operating time and space constraints.

## 6.2 Applications of the Research Findings

Work journey information is useful in planning for transport access as it is the "journey to work which determines the capacity needed on most urban roads and passenger transport" (Neutze, 1981, p. 123). Perth has undergone the process of expanding its urban transport network, beginning with the construction of the Narrows Bridge in the 1950's continuing today with freeway extensions and the electrification and expansion of the urban rail system.

Yet it is still generally accepted that the use of the private car for the work journey is both quicker and more convenient (Huxtable, 1979) than the use of public transport (if it is available, as is the case for many new suburbs). However, even where public transport is comparable to the private car, workers still prefer the latter option. One reason may lie in the fact that the journey is no longer a single-purpose trip, another factor may be that the provision of public transport has previously been normative in approach, mapping demand into predetermined supply, rather than vice versa (Hensher, 1979).

Yet in spite of these factors, the work journey is still multi-functional across the total workforce. This means that if retail and service outlets could be provided at appropriate locations, such as public transit transfer nodes, employees may be more willing to forgo the use of their cars. Examples of these facilities can be found at Boxhill in Melbourne and Edgecliff in Sydney. At present only limited applications of this concept can be found in the GPMR. These are the Perth Central Railway Station, Booragoon Bus Terminal and both the Busport and Bus Station in the CBD. In other situations, retail centres exist near public transit stops and these centres seem to support large patronage; e.g. Subiaco, Claremont, Cottesloe shopping precincts. This is not the situation in the southwest of the GPMR where retail opportunities along routes of public and private transport are infrequent and limited in scope.

In the past, the KIS has been sadly neglected with regards to public transport for workers from either that region, or in terms of linkages to Fremantle, Kwinana, Rockingham and Mandurah. At present KIS employees use very little public transport and this may in part be due to its inability to accommodate the diverse needs of the workforce. If this is the case, public transport is not adequately meeting the employee's work journey needs and the private car is the only viable alternative; hence its high profile in the region. If a multi-purpose mass transit transfer node existed near either the Kwinana or Rockingham shopping precincts, employees who are compelled to undertake multi-purpose work journeys to accomplish all the tasks necessary in the limited time available, may be persuaded to relinquish the use of their cars.

There are constraints on the ability to generalise from these results. However, most of these are due to the administration of the survey to workers. For the survey to gain the best results a question asking what day of the week 'today' was should have been included. This would have allowed any anomalies in the journey to work characteristics across the working week to be noted. Some workers may have made stops only on certain days. With the current survey design it has not been possible to identify on which days the workers have made their stops. However, this would have added another factor to the already complicated analysis.

## Chapter 7

### Conclusion

This study has identified that the changing lifestyles of the Australian urban population have meant that people can no longer afford the luxury of making several single purpose trips, but are forced, due to space and time constraints, to accomplish several functions on their major trip of the day, the work journey. Therefore, contemporary studies should endeavour to reflect this change in the nature of urban society and differ from past studies which related mainly to single purpose work journeys. By conducting a survey based on a sample of employees from the KIS, a profile of the workforce and their work journey was able to be compiled. This included details of, residential location, gender, mode of travel, employment status, age and the number and types of intermediate stops which were made.

This study represents an initial investigation into the topic and as such identifies a number of subsequent areas for further

examination. The first is to compile a better profile of the days of the week in which people make different types of intermediate stops. This would allow more consumer oriented retail business hours to be considered. A second area is to locate where people make these stops in terms of the proximity to their homes and places of employment. This would identify the regions most suitable for the development of public transport transfer nodes which provide services which employees require. The third area involves the frequency with which employees make intermediate stops, including which type of services. This is because some workers consistently make multi-purpose journeys, while for others it occurs infrequently. However, it is necessary to ascertain these levels of multi-purpose journeys if adequate information is to be compiled to aid planning, for both retail opportunities and public transport.

In conclusion, this study has demonstrated that for a sizeable proportion of the KIS workforce, the work journey, particularly the homeward bound component, is multi-functional. However, the characteristics of the different employee groups and their destinations is significant. These other aspects require further investigation if the long term objective of encouraging greater public transport utilisation is to be achieved.

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## Appendix A-PILOT STUDY QUESTIONNAIRE

### WORK TRAVEL SURVEY

PLEASE TICK APPROPRIATE ANSWERS. THANK YOU FOR YOUR CO-OPERATION.

SUBURB \_\_\_\_\_ OCCUPATION \_\_\_\_\_

UNDER 20 \_\_\_\_\_ 20-30 \_\_\_\_\_ 30-40 \_\_\_\_\_ OVER 40 \_\_\_\_\_ MALE \_\_\_\_\_ FEMALE \_\_\_\_\_

	YESTERDAY		TODAY	
	TO	FROM	TO	FROM
DEPARTURE TIME				
<i>HOW DID YOU GET TO AND FROM WORK?</i>				
PRIVATE CAR (DRIVER)				
PRIVATE CAR (PASSENGER)				
PUBLIC TRANSPORT				
OTHER (SPECIFY)				
<i>WHAT STOPS DID YOU MAKE TRAVELLING TO AND FROM WORK?</i>				
SERVICE STATION				
GROCERIES				
CHILDREN				
HOTEL/SOCIAL CLUB				
SPORT/RECREATION				
TAKE AWAY FOOD				
OTHER (SPECIFY)				

## Appendix B-FINAL SURVEY QUESTIONNAIRE

### WORK TRAVEL SURVEY

PLEASE TICK (✓) APPROPRIATE ANSWERS. THANK YOU FOR YOUR CO-OPERATION.

RESIDENTIAL SUBURB \_\_\_\_\_ OCCUPATION \_\_\_\_\_

AGE IS: UNDER 20    20-30    30-40    OVER 40    MALE    FEMALE

<u>YESTERDAY</u> HOW DID YOU TRAVEL:	<u>TO WORK</u>	<u>FROM WORK</u>
PRIVATE CAR (DRIVER)	---	---
PRIVATE CAR (PASSENGER)	---	---
PUBLIC TRANSPORT	---	---
OTHER (SPECIFY) _____	---	---
<u>YESTERDAY</u> WHEN DID YOU LEAVE TO TRAVEL: TO WORK _____ FROM WORK _____		
<u>YESTERDAY</u> WERE ANY STOPS MADE WHEN TRAVELLING:		
	<u>TO WORK</u>	<u>FROM WORK</u>
NO STOPS	---	---
SERVICE STATION	---	---
GROCERIES	---	---
CHILDREN	---	---
HOTEL/SOCIAL CLUB	---	---
SPORT/RECREATION	---	---
TAKE AWAY FOOD	---	---
OTHERS (SPECIFY) _____	---	---
-----	---	---
-----	---	---

<u>TODAY</u> HOW WILL YOU TRAVEL:	<u>TO WORK</u>	<u>FROM WORK</u>
PRIVATE CAR (DRIVER)	---	---
PRIVATE CAR (PASSENGER)	---	---
PUBLIC TRANSPORT	---	---
OTHER (SPECIFY) _____	---	---
<u>TODAY</u> WHEN DID YOU LEAVE HOME TO TRAVEL TO WORK? _____		
<u>TODAY</u> WHEN WILL YOU LEAVE FROM WORK? _____		
<u>TODAY</u> HAVE YOU MADE OR WILL YOU MAKE ANY STOPS WHEN TRAVELLING:		
	<u>TO WORK</u>	<u>FROM WORK</u>
NO STOPS	---	---
SERVICE STATION	---	---
GROCERIES	---	---
CHILDREN	---	---
HOTEL/SOCIAL CLUB	---	---
SPORT/RECREATION	---	---
TAKE AWAY FOOD	---	---
OTHERS (SPECIFY) _____	---	---
-----	---	---
-----	---	---

## Appendix C-INTRODUCTION LETTER TO THE EMPLOYEE

### TO THE EMPLOYEE,

Thank you for your co-operation with this survey. The information obtained will contribute towards a post-graduate research project at Edith Cowan University. My research topic is the travel patterns to and from work, of the Kwinana Industrial Area workforce, with particular attention to the other functions that the journey might serve. I am seeking information from Kwinana employees as to their residential suburb, mode of travel, and any stops that they may make on the journey to and from work. The survey data will be treated in the strictest confidence. Please do not hesitate to contact me at through the Department of Social Sciences on 370 6288 if you have any queries.

Thank you once again for your kind assistance with this study.

Yours sincerely,

SUZANNE WOOLHOUSE

Department of Social Science  
Edith Cowan University

## Appendix D-LISTING OF THE COMPANIES APPROACHED

Company	Letter Sent	Employee Numbers	Employee Survey	Database Number
AAA Bulk Haulage	√	√	√	13
Aaron's Removalists	√	√	x	
AG Direct Sales Pty. Ltd.	x	√	x	
Alcoa of Australia Ltd.	√	√	x	
Australian Fused Materials Pty. Ltd.	x	√	√	14
AWM Wholesalers	√	√	√	23
BHP Rod and Bar Products Division	√	√	√	4
BP Oil	√	√	√	6
Brambles Manford	√	√	√	3
C. Bellotti & Company	√	x	x	
CIG Gas & Gear	x	√	x	
Civil and Earthmoving Contractors	√	√	x	
CMS Construction	√	√	x	
Co-Operative Bulk Handling Ltd.	√	√	√	10
Coates Hire	√	√	√	15
Cockburn Cement Ltd.	√	√	√	11
Cockburn Hire Service	√	√	√	16
Coogee Chemicals Pty. Ltd.	√	√	√	8
CSBP and Farmers Ltd.	√	√	√	17
DOM-UIE Pty. Ltd.	x	√	x	
DSR Scrap Metal Recyclers	√	x	x	
ED Oates Brushware Ltd	√	√	√	18
EPT Pty. Ltd.	x	√	x	
FES Electrics	√	√	x	
Freo Machinery	√	√	x	

## Appendix D (cont.)-LISTING OF THE COMPANIES APPROACHED

Company	Letter Sent	Employee Numbers	Employee Survey	Database Number
Heat Containment Industries Pty. Ltd.	x	√	x	
Hismelt Corporation Pty. Ltd.	√	√	√	12
Hoechst Australia Ltd	√	√	√	20
ICI Advanced Ceramics Plant	x	√	√	19
ITC Pty. Ltd.	x	√	√	21
Jay R Products	√	x	x	
John Holland Construction	√	√	√	7
JW & B Spriggs Pipe Welding	√	√	x	
Kwinana Beach Liquor Store	√	√	√	22
Kwinana Hire Constructions	√	x	x	
Legal Plumbing	√	x	x	
Maxwell Chemicals	√	√	√	24
Monodelphous Group Ltd.	√	x	x	
Nalco Australia Pty Ltd	√	√	√	25
Naval Base Auto Electrics	√	√	x	
Naval Base Garden Supplies	x	√	x	
Naval Base Hotel	√	x	x	
NB Love Starches	x	√	x	
Nor-Well Transport and Plant Hire	√	x	x	
Novacoat Pty Ltd	√	√	√	26
Pacific Industrial Company	√	x	x	
Parkside Motor Company	√	√	√	27
Pipeline Induction Heat (Aust.) Pty Ltd	√	√	x	
Rocko Farm & Metal Gates	√	x	x	
Sapeng Liquid Gas	√	x	x	
SECWA (Kwinana Power Station)	√	√	√	9
Shack Motors Cockburn Pty Ltd	√	√	√	28
Terrace Smash Repairs	√	√	√	29
Ti-West Joint Venture	√	√	√	2
Timberville	√	√	x	



# **Appendix D (cont.)-LISTING OF THE COMPANIES APPROACHED**

Company	Letter Sent	Employee Numbers	Employee Survey	Database Number
Total Corrosion Control	√	x	x	
Trainee Auto Electrics	√	x	x	
Transfield Construction	√	x	x	
Transfield Shipbuilding Pty Ltd.	x	√	x	
United Construction Ltd.	√	√	√	1
Universal Fasteners	√	√	√	30
Uniway Pty Ltd	√	√	x	
Wesfarmers LPG Ltd.	√	√	√	31
Western Construction	√	√	√	32
Western Mining Corporation Ltd.	√	√	√	5
Wreckair Hire	√	√	x	

## Appendix E-LETTER OF INTRODUCTION TO COMPANIES

24 November 1992

Mr Peter West  
Refinery Manager  
BP Oil  
PO Box 131  
KWINANA WA 6167

Dear Mr West,

I am writing on behalf of Suzanne Woolhouse who is completing an Honours Dissertation in urban geography. Her research topic is the travel patterns to and from work of the Kwinana industrial area workforce, with particular attention to other functions which the journey might serve.

Besides contributing to a post-graduate award, this research is of interest to the Town of Kwinana, the Kwinana Chamber of Commerce, Transperth and the Department of Planning and Urban Development.

The Kwinana Chamber of Commerce and the Kwinana Industries Council have indicated that your firm is highly suitable for this study and subsequently I am requesting your support for Suzanne in the pursuit of this inquiry. As such, the nature of information that we would require from your firm is, the total number of employees, the number of males and females, and their residential postcodes.

To facilitate this matter, Suzanne will phone your office between the 1st and 4th of December, and arrange a time convenient for you to meet and discuss the project.

Thanking you for your assistance.

LINDSAY HUNTER  
Lecturer  
Department of Social Sciences

## Appendix F-LETTER TO THE WATERSIDE WORKERS FEDERATION

11th December 1992

Mr Jeff Harcourt  
Waterside Workers Federation  
C/o Co-Operative Bulk Handling Ltd.  
PO Box 62  
ROCKINGHAM WA 6168

Dear Mr Harcourt,

Further to our telephone discussion this week concerning my study of the Kwinana area employees, I subsequently now wish to formally request your co-operation with the second part of my study, which is a survey of the workers in the Kwinana Industrial Area. This survey merely seeks to add some depth to the information which the various firms in the area have agreed to provide me with. This information related to,

Total employees,  
Breakdown of male and female employees, and  
Residential postcodes of employees.

The survey will seek to identify how the workers travel to work and if they use the journey to work for any other purposes. Please find enclosed a copy of the intended survey form, which indicates the precise questions to be asked. This survey is in no way compulsory. However the more respondents, the greater the value of the final data produced.

Once again I wish to thank you for your assistance in helping me to complete this research study on the Kwinana workforce. Should you have any further queries do not hesitate to call me. A message can be left with the Departmental secretary on 370 6288 or you can contact me at home on 386 5260.

Thanking you for your assistance.

SUZANNE WOOLHOUSE  
Post Graduate Student  
Department of Social Sciences

## Appendix G-CROSS TAB OF POSTCODE AND AGE

	AGE					
	1	2	3	4	0	TOTAL
6007	0.0%	0.0%	0.4%	0.0%	0.0%	0.1%
6008	0.0%	0.5%	0.8%	0.3%	2.1%	0.6%
6009	5.6%	0.5%	0.8%	0.7%	2.1%	0.9%
6010	0.0%	0.0%	0.0%	1.4%	2.1%	0.6%
6011	0.0%	1.6%	0.4%	1.0%	0.0%	0.9%
6012	0.0%	0.5%	0.8%	0.3%	2.1%	0.6%
6014	0.0%	0.5%	1.2%	0.3%	0.0%	0.6%
6016	0.0%	1.1%	1.2%	0.0%	0.0%	0.6%
6018	5.6%	0.5%	0.0%	0.0%	0.0%	0.3%
6019	0.0%	0.0%	0.8%	0.0%	0.0%	0.3%
6020	0.0%	1.6%	0.0%	0.3%	0.0%	0.5%
6021	0.0%	0.0%	0.0%	0.3%	0.0%	0.1%
6022	0.0%	0.0%	0.0%	0.3%	0.0%	0.1%
6023	0.0%	0.0%	0.0%	0.3%	0.0%	0.1%
6024	0.0%	0.0%	0.0%	0.3%	0.0%	0.1%
6025	0.0%	1.1%	0.0%	0.7%	2.1%	0.6%
6026	0.0%	0.0%	0.4%	0.3%	0.0%	0.3%
6027	0.0%	0.0%	0.8%	1.0%	0.0%	0.6%
6028	0.0%	0.0%	0.4%	0.0%	0.0%	0.1%
6050	0.0%	0.5%	0.0%	0.0%	0.0%	0.1%
6051	0.0%	0.5%	0.4%	0.0%	0.0%	0.3%
6053	0.0%	0.0%	0.0%	0.3%	2.1%	0.3%
6054	0.0%	0.5%	0.0%	0.0%	0.0%	0.1%
6056	0.0%	0.5%	0.4%	0.7%	0.0%	0.5%
6057	0.0%	1.1%	0.0%	0.0%	0.0%	0.3%
6060	0.0%	0.5%	0.0%	0.0%	0.0%	0.1%
6061	0.0%	0.0%	0.4%	0.0%	2.1%	0.3%
6062	0.0%	0.5%	0.0%	0.7%	2.1%	0.3%
6064	0.0%	0.0%	0.4%	0.7%	0.0%	0.4%
6068	5.6%	0.0%	0.0%	0.0%	0.0%	0.1%
6071	0.0%	0.0%	0.0%	0.3%	0.0%	0.1%
6081	0.0%	0.0%	0.0%	0.3%	0.0%	0.1%
6082	0.0%	0.0%	0.0%	0.3%	0.0%	0.1%
6100	0.0%	0.5%	0.0%	0.0%	0.0%	0.1%
6102	0.0%	0.0%	0.0%	0.3%	0.0%	0.1%
6105	0.0%	0.5%	0.0%	0.3%	0.0%	0.3%
6107	0.0%	1.1%	0.0%	0.7%	0.0%	0.5%

# Appendix G (cont.)-CROSS TAB OF POSTCODE AND AGE

6108	0.0%	2.2%	1.6%	2.1%	2.1%	1.9%
6109	0.0%	1.1%	0.0%	0.7%	0.0%	0.5%
6110	0.0%	0.0%	1.2%	1.4%	0.0%	0.9%
6111	0.0%	0.5%	1.6%	1.7%	0.0%	1.3%
6112	0.0%	1.1%	1.2%	2.1%	0.0%	1.4%
6113	0.0%	0.0%	0.0%	1.0%	0.0%	0.4%
6147	0.0%	1.1%	0.0%	0.7%	0.0%	0.5%
6148	0.0%	2.2%	0.4%	1.7%	0.0%	1.3%
6149	0.0%	1.5%	4.5%	2.1%	0.0%	2.6%
6150	5.6%	0.5%	2.0%	2.4%	0.0%	1.8%
6151	0.0%	2.2%	1.2%	1.0%	2.1%	1.4%
6152	0.0%	2.2%	2.4%	0.7%	0.0%	1.5%
6153	0.0%	1.6%	0.8%	1.7%	0.0%	1.3%
6154	0.0%	2.7%	1.2%	0.7%	0.0%	1.3%
6155	0.0%	0.5%	0.8%	1.7%	0.0%	1.0%
6156	0.0%	2.7%	2.9%	1.4%	0.0%	2.0%
6157	5.6%	0.5%	3.3%	1.4%	2.1%	1.9%
6158	0.0%	1.1%	2.4%	1.0%	2.1%	1.5%
6159	0.0%	1.1%	0.0%	0.0%	0.0%	0.3%
6160	0.0%	1.6%	1.6%	0.7%	0.0%	1.1%
6162	0.0%	2.7%	1.6%	0.3%	0.0%	1.3%
6163	0.0%	9.2%	7.3%	10.7%	10.6%	9.1%
6164	0.0%	3.3%	2.0%	2.1%	2.1%	2.3%
6165	0.0%	0.5%	0.4%	0.3%	0.0%	0.4%
6166	0.0%	0.5%	1.6%	2.1%	14.9%	2.3%
6167	27.8%	10.9%	6.9%	8.6%	4.3%	8.8%
6168	16.7%	17.4%	13.5%	13.1%	19.1%	14.7%
6169	27.8%	8.7%	15.9%	14.5%	10.6%	13.6%
6170	0.0%	0.0%	0.8%	1.0%	2.1%	0.8%
6171	0.0%	0.0%	0.4%	1.0%	2.1%	0.6%
6174	0.0%	0.0%	0.0%	1.0%	0.0%	0.4%
6175	0.0%	0.5%	0.0%	0.3%	0.0%	0.3%
6201	0.0%	0.0%	0.8%	0.0%	0.0%	0.3%
6204	0.0%	0.5%	0.0%	0.0%	0.0%	0.1%
6205	0.0%	0.0%	0.0%	0.0%	2.1%	0.1%
6208	0.0%	0.0%	0.4%	0.0%	0.0%	0.1%
6210	0.0%	3.3%	6.5%	4.5%	2.1%	4.6%
6213	0.0%	0.0%	0.4%	0.0%	0.0%	0.1%
?	0.0%	1.1%	2.0%	1.4%	4.3%	1.7%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

## Appendix H-CROSS TAB OF POSTCODE AND GENDER

	GENDER			
	MALE	FEMALE	UNKNOWN	TOTAL
6007	0.2%	0.0%	0.0%	0.1%
6008	0.4%	0.9%	1.5%	0.6%
6009	0.7%	0.9%	1.5%	0.9%
6010	0.7%	0.0%	0.7%	0.6%
6011	0.7%	0.0%	2.2%	0.9%
6012	0.6%	0.0%	1.5%	0.6%
6014	0.7%	0.0%	0.7%	0.6%
6016	0.7%	0.0%	0.7%	0.6%
6018	0.2%	0.9%	0.0%	0.3%
6019	0.2%	0.9%	0.0%	0.3%
6020	0.7%	0.0%	0.0%	0.5%
6021	0.2%	0.0%	0.0%	0.1%
6022	0.2%	0.0%	0.0%	0.1%
6023	0.2%	0.0%	0.0%	0.1%
6024	0.2%	0.0%	0.0%	0.1%
6025	0.6%	0.9%	0.7%	0.6%
6026	0.4%	0.0%	0.0%	0.3%
6027	0.6%	0.9%	0.7%	0.6%
6028	0.2%	0.0%	0.0%	0.1%
6050	0.0%	0.0%	0.7%	0.1%
6051	0.4%	0.0%	0.0%	0.3%
6053	0.2%	0.0%	0.7%	0.3%
6054	0.0%	0.0%	0.7%	0.1%
6056	0.6%	0.0%	0.7%	0.5%
6057	0.4%	0.0%	0.0%	0.3%
6060	0.2%	0.0%	0.0%	0.1%
6061	0.4%	0.0%	0.0%	0.3%
6062	0.7%	0.0%	0.0%	0.5%
6064	0.2%	1.8%	0.0%	0.4%
6068	0.2%	0.0%	0.0%	0.1%
6071	0.2%	0.0%	0.0%	0.1%
6081	0.2%	0.0%	0.0%	0.1%
6082	0.0%	0.9%	0.0%	0.1%
6100	0.2%	0.0%	0.0%	0.1%
6102	0.2%	0.0%	0.0%	0.1%
6105	0.4%	0.0%	0.0%	0.3%
6107	0.6%	0.9%	0.0%	0.5%

# **Appendix H (cont.)-CROSS TAB OF POSTCODE AND GENDER**

6108	2.1%	1.8%	1.5%	1.9%
6109	0.6%	0.0%	0.7%	0.5%
6110	1.1%	0.9%	0.0%	0.9%
6111	1.5%	0.0%	1.5%	1.3%
6112	1.7%	0.0%	1.5%	1.4%
6113	0.4%	0.9%	0.0%	0.4%
6147	0.4%	1.8%	0.0%	0.5%
6148	1.5%	1.8%	0.0%	1.3%
6149	3.0%	1.8%	1.5%	2.6%
6150	1.5%	2.6%	2.2%	1.8%
6151	0.9%	0.9%	3.7%	1.4%
6152	1.5%	0.9%	2.2%	1.5%
6153	1.7%	0.0%	0.7%	1.3%
6154	0.9%	4.4%	0.0%	1.3%
6155	1.5%	0.0%	0.0%	1.0%
6156	2.1%	1.8%	2.2%	2.0%
6157	1.5%	3.5%	2.2%	1.9%
6158	1.3%	1.8%	2.2%	1.5%
6159	0.2%	0.0%	0.7%	0.3%
6160	1.3%	0.9%	0.7%	1.1%
6162	1.1%	1.8%	1.5%	1.3%
6163	9.7%	7.9%	7.5%	9.1%
6164	2.2%	2.6%	2.2%	2.3%
6165	0.6%	0.0%	0.0%	0.4%
6166	3.0%	0.0%	1.5%	2.3%
6167	8.6%	8.8%	9.7%	8.8%
6168	13.6%	17.5%	16.4%	14.7%
6169	13.4%	14.0%	14.2%	13.6%
6170	0.6%	0.9%	1.5%	0.6%
6171	0.4%	2.6%	0.0%	0.6%
6174	0.6%	0.0%	0.0%	0.4%
6175	0.2%	0.9%	0.0%	0.3%
6201	0.4%	0.0%	0.0%	0.3%
6204	0.0%	0.0%	0.7%	0.1%
6205	0.0%	0.9%	0.0%	0.1%
6208	0.2%	0.0%	0.0%	0.1%
6210	4.3%	6.1%	4.5%	4.6%
6213	0.2%	0.0%	0.0%	0.1%
?	1.3%	1.8%	3.0%	1.7%
TOTAL	100.0%	100.0%	100.0%	100.0%

## Appendix I-CROSS TAB OF POSTCODE AND EMPLOYMENT

	EMPLOYMENT CATEGORY			TOTAL
	1	2	0	
6007	0.2%	0.0%	0.0%	0.1%
6008	0.7%	0.5%	0.0%	0.6%
6009	1.0%	0.5%	7.1%	0.9%
6010	1.0%	0.3%	0.0%	0.6%
6011	1.2%	0.3%	7.1%	0.9%
6012	1.0%	0.3%	0.0%	0.6%
6014	1.0%	0.3%	0.0%	0.6%
6016	0.7%	0.5%	0.0%	0.6%
6018	0.5%	0.0%	0.0%	0.3%
6019	0.5%	0.0%	0.0%	0.3%
6020	1.0%	0.0%	0.0%	0.5%
6021	0.2%	0.0%	0.0%	0.1%
6022	0.0%	0.3%	0.0%	0.1%
6023	0.2%	0.0%	0.0%	0.1%
6024	0.2%	0.0%	0.0%	0.1%
6025	1.0%	0.3%	0.0%	0.6%
6026	0.5%	0.0%	0.0%	0.3%
6027	1.0%	0.3%	0.0%	0.6%
6028	0.0%	0.3%	0.0%	0.1%
6050	0.2%	0.0%	0.0%	0.1%
6051	0.0%	0.5%	0.0%	0.3%
6053	0.0%	0.5%	0.0%	0.3%
6054	0.2%	0.0%	0.0%	0.1%
6056	1.0%	0.0%	0.0%	0.5%
6057	0.5%	0.0%	0.0%	0.3%
6060	0.2%	0.0%	0.0%	0.1%
6061	0.0%	0.5%	0.0%	0.3%
6062	0.5%	0.5%	0.0%	0.5%
6064	0.5%	0.3%	0.0%	0.4%
6068	0.2%	0.0%	0.0%	0.1%
6071	0.2%	0.0%	0.0%	0.1%
6081	0.2%	0.0%	0.0%	0.1%
6082	0.2%	0.0%	0.0%	0.1%
6100	0.2%	0.0%	0.0%	0.1%
6102	0.2%	0.0%	0.0%	0.1%
6105	0.2%	0.3%	0.0%	0.3%
6107	0.5%	0.3%	7.1%	0.5%



# **Appendix I (cont.)-CROSS TAB OF POSTCODE AND EMPLOYMENT**

6108	1.0%	2.7%	7.1%	1.9%
6109	0.2%	0.8%	0.0%	0.5%
6110	1.0%	0.8%	0.0%	0.9%
6111	1.2%	1.4%	0.0%	1.3%
6112	1.5%	1.4%	0.0%	1.4%
6113	0.2%	0.5%	0.0%	0.4%
6147	0.7%	0.3%	0.0%	0.5%
6148	2.0%	0.5%	0.0%	1.3%
6149	4.2%	0.0%	0.0%	2.6%
6150	2.0%	1.6%	0.0%	1.8%
6151	2.2%	0.5%	0.0%	1.4%
6152	1.7%	1.4%	0.0%	1.5%
6153	2.2%	0.3%	0.0%	1.3%
6154	2.0%	0.5%	0.0%	1.3%
6155	2.0%	0.0%	0.0%	1.0%
6156	3.7%	0.3%	0.0%	2.0%
6157	3.0%	0.8%	0.0%	1.9%
6158	2.2%	0.8%	0.0%	1.5%
6159	0.0%	0.5%	0.0%	0.3%
6160	1.2%	1.1%	0.0%	1.1%
6162	1.5%	1.1%	0.0%	1.3%
6163	9.4%	8.7%	7.1%	9.1%
6164	2.2%	2.5%	0.0%	2.3%
6165	0.0%	0.8%	0.0%	0.4%
6166	0.5%	4.4%	0.0%	2.3%
6167	5.2%	12.5%	14.3%	8.8%
6168	10.4%	19.6%	7.1%	14.7%
6169	10.2%	17.7%	7.1%	13.6%
6170	1.0%	0.5%	0.0%	0.8%
6171	0.7%	0.3%	7.1%	0.6%
6174	0.7%	0.0%	0.0%	0.4%
6175	0.2%	0.3%	0.0%	0.3%
6201	0.2%	0.3%	0.0%	0.3%
6204	0.2%	0.0%	0.0%	0.1%
6205	0.2%	0.0%	0.0%	0.1%
6208	0.0%	0.3%	0.0%	0.1%
6210	4.0%	5.4%	0.0%	4.6%
6213	0.2%	0.0%	0.0%	0.1%
?	0.7%	1.6%	28.6%	1.7%
<b>TOTAL</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

## Appendix J-CROSS TAB OF AGE, GENDER, EMPLOYMENT CATEGORY AND STOP CATEGORY ON THE JOURNEY TO WORK

GENDER	EMPLOYEE	AGE	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
MALE	WHITE	1	0	0	0	0	0	0	0	0	0	0	0	0	0
		2	5	3	2	0	0	0	2	2	0	0	0	1	15
	COLLAR	3	11	3	5	2	0	1	0	3	5	0	0	2	32
		4	6	3	7	3	1	0	2	7	3	1	1	0	34
		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SUBTOTAL	22	9	14	5	1	1	4	12	8	1	1	3	81
	BLUE	1	0	1	0	0	0	0	0	0	3	0	0	0	4
		2	6	5	0	1	0	0	2	0	5	2	2	0	23
	COLLAR	3	14	11	2	0	0	0	0	0	7	1	0	2	37
		4	8	6	7	3	1	0	0	0	12	0	0	0	37
		0	0	3	0	0	0	0	0	0	0	0	0	0	3
		SUBTOTAL	28	26	9	4	1	0	2	0	27	3	2	2	104
	UNKNOWN	SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL		50	35	23	9	2	1	6	12	35	4	3	5	185
FEMALE	WHITE	1	1	0	0	0	0	0	0	0	0	0	0	0	1
		2	8	0	2	1	0	0	5	0	5	1	0	1	23
	COLLAR	3	5	2	0	0	0	0	0	1	7	0	0	0	15
		4	6	0	0	0	0	0	4	0	1	2	0	1	14
		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SUBTOTAL	20	2	2	1	0	0	9	1	13	3	0	2	53
	BLUE	1	0	0	0	0	0	0	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0	0	0	0	0	0	0
	COLLAR	3	0	0	0	0	0	0	0	0	0	0	0	0	0
		4	0	1	0	0	0	0	0	0	0	0	0	0	1
		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SUBTOTAL	0	1	0	0	0	0	0	0	0	0	0	0	1
	UNKOWN	SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL		20	3	2	1	0	0	9	1	13	3	0	2	54
UNKNOWN	TOTAL		17	7	4	0	0	0	1	0	16	0	1	0	46
GRAND TOTAL			87	45	29	10	2	1	16	13	64	7	4	7	285

# **Appendix K-CROSS TAB OF AGE, GENDER, EMPLOYMENT CATEGORY AND STOP CATEGORY ON THE JOURNEY FROM WORK**

GENDER	EMPLOYEE	AGE	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
MALE	WHITE	1	2	0	0	0	0	0	0	0	0	0	0	0	2
	COLLAR	2	17	1	0	3	2	0	1	2	1	2	9	0	38
		3	17	0	0	3	3	1	3	4	7	4	9	3	54
		4	23	0	0	9	2	1	2	1	11	6	6	10	71
		0	1	1	0	0	0	0	0	0	0	0	0	0	2
		SUBTOTAL	60	2	0	15	7	2	6	7	19	12	24	13	167
	BLUE	1	1	0	0	0	0	0	0	0	3	0	0	0	4
	COLLAR	2	7	2	0	1	1	0	1	0	5	6	2	0	25
		3	13	2	1	5	1	0	1	0	8	18	9	5	63
		4	16	1	1	12	0	1	0	0	9	15	3	0	58
		0	0	0	0	1	0	0	0	0	0	0	0	0	1
		SUBTOTAL	37	5	2	19	2	1	2	0	25	39	14	5	151
	UNKNOWN	SUBTOTAL	0	0	0	1	0	0	0	0	0	1	0	0	2
	TOTAL		97	7	2	35	9	3	8	7	44	52	38	18	320
FEMALE	WHITE	1	0	0	0	0	0	0	0	0	1	0	0	0	1
	COLLAR	2	6	0	0	15	2	2	4	4	4	0	2	1	40
		3	9	1	0	13	2	0	4	4	7	1	1	0	42
		4	4	0	3	12	1	3	5	2	3	0	1	4	38
		0	0	0	0	1	0	0	0	0	1	1	0	0	3
		SUBTOTAL	19	1	3	41	5	5	13	10	16	2	4	5	124
	BLUE	1	0	0	0	0	1	0	0	0	0	0	0	0	1
	COLLAR	2	0	0	0	0	0	0	0	0	0	0	0	0	0
		3	1	0	0	3	0	1	0	0	1	1	0	0	7
		4	0	0	0	1	0	0	0	0	0	0	0	0	1
		0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SUBTOTAL	1	0	0	4	1	1	0	0	1	1	0	0	9
	UNKOWN	SUBTOTAL	1	0	0	2	0	0	1	0	0	1	0	0	5
	TOTAL		21	1	3	47	6	6	14	10	17	4	4	5	138
UNKNOWN	TOTAL		16	2	1	12	5	1	3	2	11	17	10	8	88
GRAND TOTAL			134	10	6	94	20	10	25	19	72	73	52	31	546



# **Appendix L (cont.)-CROSS TAB OF POSTCODE AND STOP CATEGORY ON THE JOURNEY TO WORK**

6110	1							1					2
6111	3								2				5
6112	4								1				5
6113	1						2		1				4
6147	1												1
6148	2	1							2				5
6149	2		2	2									6
6150	5	1	1						4				11
6151	2	2							4				8
6152	2												2
6153					1		1						2
6154	4									1			5
6155			2			1		2					5
6156		1											1
6157	3		1	2					4				10
6158	2	3	2				3						10
6159									4				4
6160	1	1		1				1					4
6162	3	1	2								1		7
6163	6	4	5	3			2	3	2				25
6164	2												2
6165													0
6166	2	2											4
6167	3	2	4	2			2		9		1		23
6168	5	6	2				3		6	1			23
6169	5	3	1		1		2		12	3	3	2	32
6170								1	1				2
6171							1						1
6174			2										2
6175													0
6201													0
6204													0
6205													0
6208													0
6210	9	1	1						6	1		2	20
6213													0
?									1				1
TOTAL	87	45	29	10	2	1	16	13	64	7	4	7	285



# **Appendix M (cont.)-CROSS TAB OF POSTCODE AND STOP CATEGORY ON THE JOURNEY FROM WORK**

6108	3			2					3		1		9
6109	1								3				4
6110										1			1
6111	1			1					4	1	2	4	13
6112									1			1	2
6113	1			1			2						4
6147				2	1		1				1		5
6148	3			6	1				2		2		14
6149	7			2		1		1	1	1	1		14
6150	2		1	2					2			1	8
6151	3			1	1			1	4	1			11
6152	3		1	3	1						3	1	12
6153	3											1	4
6154	3			3	3		3				1		13
6155	4			1				2	2				9
6156	6			2			2	1	1	3			15
6157	4	1	1	5	1				5	1	2	2	22
6158	3	1		2					1		2	1	10
6159									2				2
6160	1								1		1		3
6162	2	1										1	4
6163	5	1	0	7	0	1	3	0	2	5	2	1	27
6164	2			2						3		3	10
6165	1						1						2
6166	4	2		1						12	1	1	21
6167	1	1		11	1	1	3	3	9	2	1	1	34
6168	18		1	11	5	2	4	6	7	9	5	1	69
6169	13	3		8	4	3	2	1	9	16	9	6	74
6170										1		1	2
6171	1			3						2		1	7
6174	1												1
6175				1									1
6201											1		1
6204							1					1	2
6205									1	1			2
6208	2												2
6210	7			3			2	2	9	3		2	28
6213	1			1									2
?	3			2							1		6
TOTAL	134	10	6	94	20	10	25	19	72	73	52	31	546











































